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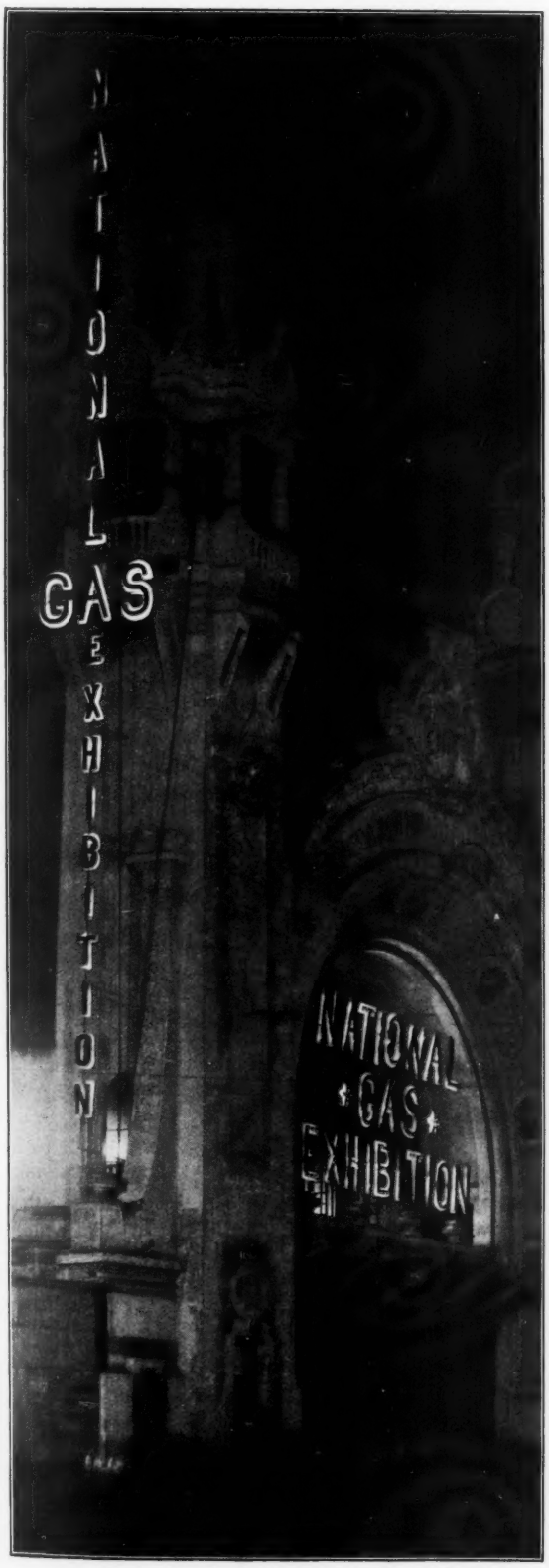


The Exterior of the Exhibition Building—A Night Photograph taken by Messrs. John H. Avery and Co.

EDITORIAL NOTES.

The Exhibition.

AFTER hard and strenuous work, the result will be spread before us to-morrow, with, probably, the exception of a few finishing touches, to give completeness and perfection. The picture (the position of the work at the time of going to press enables us to say) is one of broad and variegated composition; and, in every detail of it, there are lessons not only for the public but for the administrators, the executive officers, and the rank-and-file of the gas industry. It forms a vast and attractive demonstration of the industry's progress and development. Until the display was approaching completion, one could have but a faint conception of what the creative work (the progress of which we have watched from the clearing away of the dust and *débris* of former exhibitions in the International Halls at Shepherd's Bush to the present state) would eventually present to our eyes. We are more than satisfied; and we are sure that every penny of the money that has been, and must still be, spent on this industrial demonstration has been well spent. An industry of the commercial status of ours, with such an immense influence in the markets of the country, and with such a powerful place in ministering to the needs of the community and in promoting the country's economy in its domestic, industrial, and public spheres, could not afford to make a demonstration of the advancements in the applications of its staple commodity in any parsimonious spirit. Such a method of demonstration would only have belittled, given a false impression, and excited mirth among the industry's competitors. This demonstration at Shepherd's Bush is well worthy of the industry; and it is at once an attractive and a dignified display. The halls are transformed into places of light and leading—places built-up of, in charming environment, those object-lessons which are best driven home to the mind by optical means. The visitor will pass from object-lesson to object-lesson, ever varying in character, and so never tiring him—the one thing only stimulating the desire to see the next, and so on and on to the end of the wonderful display. To have carried through to completion the countless details composing an exhibition of this nature is really a masterpiece, and a lasting testimonial to the central worker. There will, however, be some relief now (though responsibility does not end here) in handing over the finished scene to those who will be during the month interesting and instructing the public by the aid of the display.

To-morrow the President of the Exhibition (Sir Corbet Woodall, D.Sc.) will welcome at the exhibition the Lord Mayor of London (Sir David Burnett, Bart.), and numerous guests representative of the civic and professional life of our country; and his Lordship will declare the exhibition open, and so inaugurate its mission. We ought to have said "missions;" for it has, we are fully persuaded, more than one. We can see several effects springing from the display. Belief and confidence in the gas industry (strong as belief and confidence now are, as reflected by credit generally and the position in the stock markets) will further spread and be hardened; for, truth to tell, the general public have little notion of the ramifications and extent of the industry's operations. We therefore again urge upon all managements of gas undertakings not to neglect the opportunity of getting representative men from all localities to London and to the exhibition, even if they have to personally invite them to come. For only by the largest possible public representation in the halls and corridors of the extensive exhibition will the most important part of its mission be served and fulfilled. The impression that will be made cannot but effect a lasting good, universally and locally. The cognizance of the general public as to the prolific manner in which the old-standing tree that represents the gas industry has grown, and continues to send forth new shoots that of themselves will develop into new

industries, is very narrow and superficial; and there is certainty that the exhibition will convey more to the public by means of actual representation than by all the literature and the most eloquent rhetoric that a gas undertaking can command. The exhibition will show the public how the gas industry renders economical and efficient service in almost every walk of life; and it will disclose the fact that it is largely due to the variety of its operations, and to the expanse of these operations, that the industry enjoys such stability and commercial and financial safety. It will further show how the industry shapes itself with the times, and how the times favour its development. It will also show that the springs of initiative in the industry, instead of beginning to dry up, are flowing more copiously than ever.

There are the men of the gas industry. We opine that, through the influences of the exhibition, there are even some of these who will have their outlook broadened and their commercial faculties sharpened. The requirements of the public are not to be measured by the standards of a past day. There is always the current standard; and working to that can alone be effective in the maintenance of prosperity. The exhibition will, we hope, help those responsible for the management of some gas undertakings to realize this; and not only so, but to grasp the fundamentals of commercial development, and exercise themselves in showing in domestic and industrial life how lighting and heating may now be done better than ever before. The domestic and industrial chimneys of some of our towns would not be smoking and scattering grime so frequently if there was greater penetration by the members of certain gas staffs behind dwelling-house and factory doors. Conversion of method behind such doors is going on apace in many gas-supply areas; and the work that is being accomplished will be helpful in carrying on the work among those adherents of the old methods who offer the greatest resistance. But we are thinking of the managements who do not trouble to give people an opportunity even of resisting advances to change their methods of doing things in regard to light, heat, and power from the crude and uneconomic way to the more efficient and, therefore, the more economic way. The exhibition will be useful in activating such, and in administering a tonic to any hypochondriacs who may exist in connection with gas affairs. Such men are an industrial disadvantage, and a drag on the progressive undertakings of the country; for the influence of neglect anywhere is something that does not stay at home, and has to be counteracted elsewhere. But generally the sooner the exhibition is visited by gas men, whether gas progressives or negligents, the better. And for two reasons: Because the first visit will make them desire to repeat it personally; and a visit will cause them to return home resolved to make the best possible use of the exhibition while it lasts. A month is a short time; and the exhibition has cost much money—shared between some gas-supply undertakings and most of the manufacturers of gas apparatus and appliances. To continue the exhibition beyond the month, if it were at all possible, would cost much more money; so that it is important to watch the time-limit, and to keep well in memory, in making arrangements to obtain the utmost benefit out of the wealth of display, that such a demonstration cannot be made by the industry at frequent intervals. The opportunity for making profitable educational use of it must not be missed. By so taking advantage of it, the administrators and officers of the gas industry will be helping to ensure the abundant success of the demonstration which must be the desire of every well-wisher of the industry.

We cannot conceive of anyone in the industry having a desire to the contrary, which remark leads us to express the hope that those among gas administrators who have not assisted in providing the funds to build up the exhibition will visit Shepherd's Bush. They will be heartily welcomed; for if the invitations hitherto made to subscribe to the display have not appealed to them sufficiently to cause them to loosen their purse strings, the exhibition itself may perhaps be more persuasive through the eloquence of its practical worth. The extensive general account which we publish to-day of what is to be seen at the exhibition may help such administrators to resolve to visit it; and if the resolve leads from one good resolution to another, the work undertaken in presenting to the industry such an early account of the exhibition will not have been in vain. The exhibition itself, the mission of the exhibition in informing the world of the capacity of the industry, must be more persuasive than any words of our own. We feel confident of this, just as we are confident of the success of its objects. The month before us is one of the months that will stand out in all the memories of those who live in the gas industry, who are truly of the industry, and who are most desirous of showing the world its proud status, and the contribution it makes to the utilities, the pleasures, and the economies of life.

The Gas-Cultured Shareholder.

Do gas companies make sufficient use of shareholders in their publicity work? Without hesitation, the answer can be given in the negative. The shareholder is treated too much as a mere investor, who has a right to a copy of the report and accounts and to attend a meeting once each half year or year as the case may be, have on such occasions information imparted to him as to the working and financial condition of the concern, and then be paid the declared dividend. In the interim, there appears a complete detachment of all interest between him and the undertaking; and he is reduced almost to the position of a nonentity. This is a pity; and in these days of competition, and days when the competition demands the utilization of every available means of obtaining publicity and the distribution of information, there is, by the neglect of a judicious special education of the gas shareholder, lost to the gas undertaking a mass of potential influence, and an information-circulating medium of a no mean order. One cannot, of course, expect a shareholder to act as a canvasser for a gas undertaking; and one cannot expect a shareholder to talk of gas in season and out of season. But a shareholder having money invested in a concern must have greater interest—an interest open to development—in the commodity dealt in than a man who is not the holder of shares. Yet we have met holders of stocks and shares in gas companies who are so ignorant of the commodity from the profits on which they derive part at any rate of their income, that they would be absolutely incapable of defending it in any social circle where lighting or heating happened to be raised as a topic of conversation, and where possibly a man whose interest in a rival commodity was holding up its virtues as of superlative order. Gas shareholders who can talk intelligently of gas, of its economic and hygienic advantages, are an asset to the gas industry. The subject is not such an intricate one as (say) national and imperial politics; and we therefore see no reason why ways and means should not be adopted of unobtrusively serving up to gas shareholders, in attractive small doses periodically, information which would add to their knowledge of an article of commerce in which they are financially concerned. Knowledge will unconsciously show itself when opportunity invites it.

Some time since, we saw a copy of a four-page circular that an electric light company proposed to distribute quarterly to the householders in their district. It was a bright, pithily written production. There were no long articles in it; but crisp information which brought at once to notice the point it was desired to convey. It was intended that the circular should contain quarter by quarter fresh information about new electrical appliances for domestic and industrial use. Some such means could be adopted for educating the gas shareholder; but we would not confine the information to new appliances or fresh applications, but would suggest that the primary information should be of a character that would equip the shareholder with the knowledge necessary to defend and uphold the merits of gas, and to supply the retort to its traducers. A shareholder properly educated in gas matters is better than one improperly informed. If there is anyone prepared to deny this, we shall be pleased to hear from him, and to discuss his contrary contentions. The truth of the submission is, indeed, so obvious that it must be generally accepted; and, if it is accepted, why not take steps, without making any unnecessary fuss or display, to tempt a development of an intelligent interest and knowledge on the part of the shareholder in commercial gas affairs, by putting the information in his possession?

Question a hundred gas shareholders who are not officially or in some other way immediately identified with gas supply, and we hazard the opinion that a very large majority of them would not be able to do more than say that, to the best of their belief, electricity—light for light, and hour for hour—is more expensive than the modern forms of gas lighting. There is room for expanding knowledge. Let a number of lay investors in a gas undertaking be in a room

where some one raises a question as to the products of gas combustion on information derived from that most unreliable and presumptuous source—electrically prepared literature, and we venture to say that few of them could intelligently discuss the matter. Again, take the favourite fantastic notion of the commercial rivals of gas regarding the deprivation of the atmosphere of oxygen by the combustion of gas. How many among ordinary gas shareholders could pour the deserved contempt and ridicule on the point? How many, too, among them could say why, from the point of view of optical hygiene, electric lamps are inferior to incandescent gas-lamps? They know little or nothing of what is meant by intrinsic "brilliancy," or by the ultra-violet rays, or by "photophthalmia." We question if many of them are as yet aware of the growing knowledge of the medical profession as to increasing defective vision owing to the character and quality of electric lights—a growing knowledge that was demonstrated at the recent International Medical Congress. Few of them, too, know anything of the researches that have proved the fact that the spectrum composition of incandescent gas light is the better of the compositions of the two chief rival artificial illuminants for shopkeepers who deal in colours, or for manufacturers who work in colours. This subject, like the previously mentioned one, has been recently dealt with in our columns. There is the new campaign on the part of the electrical industry to capture part of the gas-cooking load. How many gas shareholders, given the opportunity, could intelligently discuss the arguments that are being used in this regard on the electrical side; and how many know of the deficiencies of the electric-cooker? There are the subjects of domestic gas heating, and the newly developing branch of gas-heated hot-water circulators. What information do they possess on these subjects? Practically no more than that of the ordinary man without pecuniary interest in gas. The industrial use of gas is of less importance in this particular connection. It is a branch of the gas business that requires the special attention of the man properly trained to the work. But the matters enumerated in the foregoing supply, together with informative references to the best means of applying gas to the several purposes, ample topic for serving-up in quarterly or half-yearly circulars to gas shareholders.

We make a free present of the idea to the British Commercial Gas Association. A circular of the kind could be best prepared from some properly equipped centre; and it could be localized by printing the name of any gas undertaking on the title-page. The expense to each gas company would not be great. Of course, it may be argued that gas shareholders are not all local men. That does not matter. Gas is ubiquitous; and so are gas shareholders. Holders of shares in one gas company may live in another company's area; and there may be gas consumers in the area who are shareholders in other gas companies. Nor is the influence of a man necessarily confined to the district in which he resides; in these days man travels more than ever he did. However, all we care about is that the gas-cultured shareholder is a useful individual, and an educated means to the end of publicity. We do not expect the gas shareholder to become a gas canvasser. But official gas canvassers cannot be everywhere; and gas shareholders are more numerous than gas canvassers. Ignorant gas shareholders abound. Displace their ignorance by knowledge; and will not the result be of advantage to the gas industry?

Flight in Gas-Fire Efficiency.

When it was first announced by the "Journal"—now some time ago—that certain makers of high pressure incandescent lamps had, according to independent tests made in photometrical laboratories in London, invented a form of high-pressure inverted lamp whereby an efficiency of between 60 and 70 candles per cubic foot of gas consumed had been realized, there were people who smiled, and were sceptical to the point of treating the claim to ridicule and contempt. But truth must always have ascendancy over ridicule and contempt which can boast of no firmer foundation than scepticism and disbelief in the possibility of further progress. Thus it has come about that it is now generally accepted that, given proper treatment and gas supply, high-pressure lamps are on the market which will return to the user an efficiency in proximity to 60 candles per cubic foot of gas consumed. To-day we are treated to a surprise in the matter of the radiant efficiency of gas-fires. Gas-fire progress has also been steady during the past few years; and all owing to the change from traditional procedure to scientific guidance in relation to all vital parts in the structure of the gas-fire. Although progress has been of the gradual order, we have been perfectly satisfied with the aggregate result; and it must be admitted that, without this progress, one of the most fertile fields now lying before the gas industry, and ripening for its occupation, would have been practically closed to it. This indeed would have been a serious matter; but we are spared from considering what might have been, in view of the substance of what actually does exist.

The ordinary test of material progress in gas-fires is the radiant efficiency in relation to the heat energy of the gas consumed. This test has been generally accepted, though hygienic efficiency must never be allowed to be subservient to it. During recent years, through the improvements in construction, in burners, and in fuel, the radiant efficiency of gas-fires has gradually ascended from (say) 35 per cent. to 50 per cent., and rather over in some gas-fires. From the neighbourhood of these figures, the best energies of the makers did not seem capable of effecting any movement; and it had been accepted that there was little chance of doing much more in this direction, having regard to the necessities of the chimney and the impossibility of avoiding something in the way of convected heat. But Messrs. Wilsons and Mathiesons have been quietly and seriously working at the problem of increasing the radiant efficiency. The mere fact of their having been doing so is a revelation of their conviction that the ultimate radiant efficiency had not been achieved; and now—we say this on the authority of Mr. John Bond—they have succeeded in realizing something that has justified their conviction, and has produced something that comes to us (as previously said) as a surprise. We are not prepared to question the new claim. The certificate of Mr. Bond prevents our doing so; and the testimony of those who have seen the new "Sola" fire (for so it is named) assures that the firm have scored a highly creditable success. Mr. Bond's test ascribes to the fire a radiant efficiency of 73·1 per cent. To say that this is "remarkable" is to use a very modest term. It is just as astonishing as the flight of high-pressure lamps from an efficiency of below 40 candles per cubic feet to 60 candles or thereabouts. The claim to radiant heat supremacy on the part of the "Sola" fire (which claim sensibly out-distances anything we have seen put forward by contemporary makers) will no doubt set critics to work; but the makers appear to have well fortified themselves against this. Anyway, the new achievement will act as a spur to the other manufacturers.

The latter, we think, will agree that Messrs. Wilsons and Mathiesons are in possession of a fuel that is second to none on the market; and this fuel, and the burner that the firm have now produced, combine to give the result which Mr. Bond certifies. The credit for the more recent advance is awarded to the burner, which, through the volume of air taken in without producing noise—a volume that is in the region of the theoretical proportions for realizing perfect combustion of ordinary town gas—and the perfection of the mixture obtained, yields higher flame temperature than has previously been achieved by the firm. It would be an extremely interesting thing if the firm could prevail upon Mr. Bond to give more information—an analysis of the gas with which the test was made, and the measured gross calorific power, together with an analysis of the flue gases, and the temperature. It seems pretty clear, however, that to improved flame temperature, in conjunction with a high-class fuel, the firm ascribe the result registered. We welcome the announcement as to the advance, which announcement is made with a confidence that gives assurance as to the firm's preparedness to defend their claim. There is always, in the common interest, pleasure on our part in circulating information as to notable advance such as this; and there is also the moral obligation resting upon independent journals of rendering honour to whom honour is due. We believe the new fire will be among those on view at the National Gas Exhibition.

Working Efficiency.

It was an eminently practical Presidential Address which Mr. H. D. Madden, of Cardiff, delivered last week to the Welsh Institution of Gas Engineers and Managers. It was not a long address; but it had a cardinal point, and that was works efficiency, and it also indirectly raised the question as to whether in the gas industry all undertakings take a proper

basic standard to test the efficiency of working. There is, indeed, nothing more difficult in the gas industry than to determine the proper standard for comparative judgment. To the best of our knowledge, there is no better standard of efficiency than the profit made per ton of coal carbonized. This, however, for comparative purposes, is subject to the two main factors of the price charged per 1000 cubic feet, and the number of B.Th.U. that are supplied to the consumer for the price paid. Really it is amusing to see how often technical men are found to plume themselves upon their works' efficiency on the one factor of the quantity of gas made or sold per ton of coal carbonized. Relatively to the working of other engineers this one factor cannot definitely prove anything; and it may indeed be an altogether vicious standard of comparison. It seems childish to have to point this out; but it is a practice that so largely prevails that it is well occasionally to have out the truth of the matter. Take, for example, some of the Welsh works. If some of them purchased coal that would produce (say) 14,000 cubic feet of gas per ton of a calorific value of about 520 B.Th.U. gross, they could not show the same net profit per ton of coal carbonized as they can do by purchasing perhaps an inferior local coal which costs them less money per ton delivered on the works. So is it in other parts of the country. And it comes to this, that works' efficiency cannot possibly be separated from managerial efficiency in the purchase of coal which will give the largest profit per ton, subject to the current price of gas, and to the calorific value, together with the current market conditions governing the sale of residual products.

Mr. Madden made the proper selection of coal the first stage in his address on works' efficiencies; and its importance cannot possibly be overrated. His second point was that no general law can be laid down as to the proper carbonization treatment of all classes of coal in order to ensure the best results—such as make of gas, calorific value of gas, quality of coke, and yield and quality of tar and ammoniacal liquor. This is a matter that must be studied by every gas engineer under his local conditions. Having arrived at a proper determination on the point, then consideration has to be given to subsidiary matters contributing to maximum works' efficiency—matters that we know from investigation are too often neglected on some of the gas-works of the United Kingdom. It is a very proper thing to get the best make of gas per ton of coal that will give to the consumer the best thermal value for whatever price he pays for his gas; but this, as already said, is not the sole and comprehensive test of works' efficiency. Incidentally, this brings us to another point. It is that price is not a safe standard for comparison between any two undertakings, unless it is known precisely what the price includes. It may be that one undertaking does not charge meter-rent, while the other does. It may be that one undertaking lends free of charge certain gas-consuming appliances, while the other does not. It may be that one undertaking maintains gas-fires in proper working condition free, while the other does not. It may be that one undertaking maintains incandescent gas-burners altogether free of cost to the consumers, while the other does not. These are all disturbing elements to be considered in making comparisons.

But this is an aside. The two subsidiary points affecting works' efficiency that Mr. Madden had to criticize were as to ammonia yields per ton of coal carbonized, and fuel accounts—both of which are often neglected, or treated in a perfunctory manner. Somewhat frequently we have referred to the first point in these columns; and Mr. Norton H. Humphrys has given extended consideration to it in his recent articles in our pages. Now Mr. Madden urges the same point, and gives it as a settled conviction from his observations that greater attention to carbonizing conditions and to the storage of ammonia would well repay many gas undertakings. A cautionary word may also be uttered in regard to the basis of the sale of ammoniacal liquor. There are some managements of gas undertakings that do not test their liquor, but accept the results of tests made by the purchasers, quality forming the basis of contract. In their generosity, some managers may have reliance upon the possession of an inviolable honesty on the part of the purchasers of their ammonical liquor. These purchasers may not necessarily be deliberately dishonest. They may not, however, always take the trouble to test the liquor delivered to them, so long as they are not dissatisfied with its yield. But there are gas-works which sell on the qualitative value of their liquor that, if tests were instituted at home, and there was insistence on being paid for value received, would see the revenue for this residual substantially advanced per annum. The other point is the fuel account. There has been a revival lately of the question of the automatic governing of the air supplies of retort-settings; and as to the beneficial results that accrue in the saving of fuel and in producing uniformity of heating conditions in the settings. We will not dwell upon this point on this occasion; but, without betraying any confidence, we may say that a gas engineer who has in connection with his works studied this matter of fuel use and economy has been able to bring down his fuel account to such a level that the difference in the quantity of coke for sale, during the recent times of good demand, was more than equal in a single year to the salaries of himself and his assistants.

These were points in Mr. Madden's address, which may be summed up by saying that it is only by a knowledge of the exact conditions prevailing on a works that ultimate works' efficiency can be secured. It was not a long address; but it was based upon the soundest of principles in works' management.

A New Trades Union.

An item of news which has been received with somewhat mixed feelings was published in the daily papers last week. This was the announcement of the formation of an association of employers of labour, with the object of consolidating their forces and of maintaining their rights and their freedom to bargain individually with free workers or collectively with trade unions. The exact title of the new organization is the United Kingdom Employers' Defence Union; and it will be registered as a trade union. It is the result of a meeting which was held under the chairmanship of Lord Dysart; and the intention is to create a guarantee fund of no less a sum than £50,000,000. Calls on the funds will be *pro rata* on the whole of the members; but such calls shall not exceed 7½ per cent. in any one year. It is thought, however, that much less than this proportion will be sufficient to secure adequate protection for men willing to work and employers willing to engage them. Whatever may be the opinions held as to the wisdom of such a move, it must be conceded that, in view especially of recent events, defensive action on the part of employers is not at all to be wondered at. Possibly, and perhaps naturally, organized workers will regard the proposal with distrust, in spite of the declaration that there will be no antagonism towards trade unions which respect the liberty of non-unionists. Present-day trades unionism policy seems inevitably to include an endeavour, by fair means or otherwise, to bring the maximum number of workers within the fold. But so far as the industrial welfare of the country is concerned, the defeat of tyrannous action on the part of trade unions can hardly prove a disadvantage; and therefore it is impossible for impartial observers to regard with disfavour the avowed intention of the Defence Union to deal with what are regarded by the promoters (and by others) as two great evils arising out of the Trades Disputes Act—boycotting and "peaceful picketing." In connection with any criticism that may be offered, it should be remembered, too, that the suggestion is, before ever taking action, to consider each dispute strictly on its merits.

Rust under Paint.—From experiments made by Dr. E. Liebreich and Dr. F. Spitzer, as reported in "Die Umschau," it appears, according to a paragraph in the Engineering Supplement to "The Times" last Wednesday, that the general opinion that rust in iron is prevented by a cover of paint is not always correct, and that in fact the paint itself may be the cause of rust. During the experiments made, it was found that polished steel bars which had been given one coat of paint, and upon which distinguishing numbers were painted, rusted principally, and in some cases solely, in the place where they might have been considered to be doubly protected—viz., under the thicker layer of paint at the numbers. Five colours were then selected, and some iron plates were given one coat and some four coats of paint—each coat being perfectly dry before the other was applied. These were exposed during 24 hours to a jet of steam. The plates with one coat remained intact, whereas the others were completely rusted. It is surmised that this result is due to the fact that the varnish of the second coat dissolved the paint of the lower one, and thus made it porous, and the porosity increased with the number of coats applied.

THE NATIONAL GAS EXHIBITION.

INTERNATIONAL EXHIBITIONS HALLS, SHEPHERD'S BUSH.

[Entrance in Uxbridge Road.]

OCTOBER 1 TO NOVEMBER 1.

Organized by the Leading Gas Companies and Corporation Gas Committees of the United Kingdom and the Society of British Gas Industries.

President = SIR CORBET WOODALL, D.Sc., M.Inst.C.E.

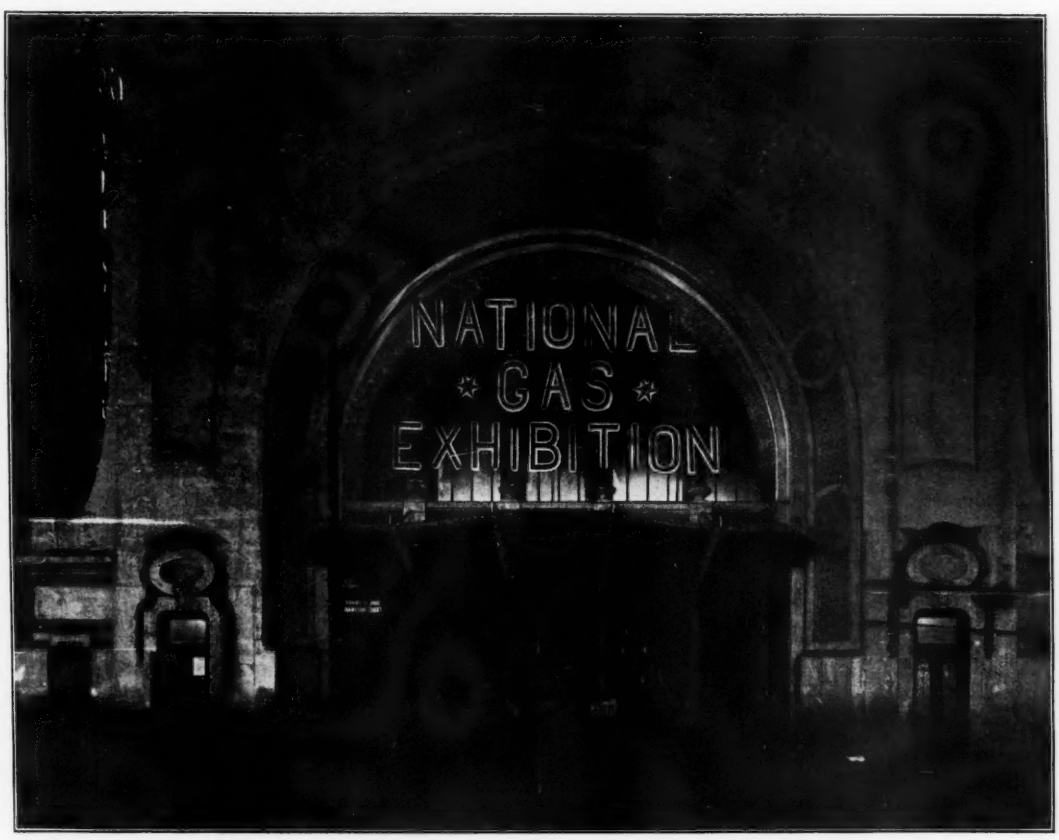


Photo. by JOHN H. AVERY AND CO.

THE FRONT ENTRANCE TO THE NATIONAL GAS EXHIBITION.

[Taken before the Lighting-up of the Keith "Silica" High-Pressure Lamps.]

NOTES FROM THE EXHIBITION.

Nine years have passed since the Earl's Court Gas Exhibition was held. There is a remarkable contrast between that picture and this one.

WHEN the Lord Mayor of London (the Right Hon. Sir David Burnett, Bart.) congratulates the gas industry to-morrow upon its exhibition, the spokesman for the gas industry (Sir Corbet Woodall, the President of the exhibition) will in return be able to congratulate his Lordship upon the conferment upon him of a baronetcy by the King, who is a patron of the exhibition.

Hearty congratulations to Mrs. M. A. Cloudesley Brereton, who is the "Chairman" of the Editorial Committee of the exhibition, upon the excellent guide that she has been instrumental in producing, by the aid of fellow workers, among whom must have been the Chairman of the Executive Committee (Mr. F. W. Goodenough), who alone seems to have all the details at his fingers' ends. The President has a preface in the book explaining the aims and objects of the National Gas Congress and Exhibition."

There are wonderful lists of patrons and Vice-Presidents—their Majesties the King and Queen and Her Royal Highness the Princess Louise of Argyll heading the list of the former. There is also a "Diary of Daily Events," a guide to the exhibition, and a descriptive rapid tour of the show. Programmes and appendices complete the book, a copy of which will be well worth preserving.

Points to specially look for in the exhibition:

- Ventilating sun-burners.
- Concealed lighting for shops.
- Semi-indirect illumination fittings.
- Electricity generation by gas-engines.
- High-pressure factory lights in small units.
- High-pressure lamps of 4000-candle power.
- Efficient lighting and extinguishing devices.
- New gas-fires of good external design for mansions.
- A gas-fire giving over 70 per cent. radiant efficiency.
- High-pressure lamps with silica cups round the mantles.
- New method of testing hemispherical candle value of high-power lamps.
- A hot-water circulating system that works contrary to the customary order of things, and gives an excellent account of itself.

Next week we shall be giving a full report of the opening of the exhibition; and the various other events of the week will be duly noted, including the proceedings at conferences, &c.

A GENERAL ACCOUNT OF THE CO-OPERATIVE EXHIBIT.

THE noise and bustle of preparation have almost ceased; and to-morrow the great co-operative display of the gas industry, which will specially appeal to the public, will be opened by the Lord Mayor of London (Sir David Burnett, Bart.), in the presence of civic and many other notable guests, brought from all quarters of the United Kingdom. Let us not forget that, apart from the primary object of this demonstration of the progress of the gas industry in its applications of gas, and in promoting the world's economy, that it has a meaning special to the gas industry. It is part of its celebration of two important events in its history—the centenary of statutory gas supply (the first Company operating under parliamentary powers having been the Gaslight and Coke Company), and the Jubilee of the Institution of Gas Engineers. And this celebration of these two historical events and the typical demonstration in multifarious ways and forms of the progress of the application of gas for lighting, domestic and industrial heating, and power, is financed by several of the gas undertakings of the United Kingdom, by the members of the Society of British Gas Industries, and by certain others interested in the gas industry.

The exhibition represents the current stage in a wonderful history—a history that is almost romantic in its development, and which development has been greater in the past quarter of a century than ever before, and promises, through new and extending applications, to be greater still in the future, and to add by enhanced measure to the conveniences and economy of the people. We need only look round the exhibition, and then, to see progress in all its munificent meaning, look back from the high-pressure lamp as it is to-day to the days of the flat-flame burner; from the gas-engine as it is to-day, to what it was but a few years ago; from the thousand-and-one applications of gas to industrial work of the present to the unclean slow methods of heating by coal and otherwise; from the shop windows brilliantly lighted by gas-lamps, which display goods in their natural colours, to the old flickering flames of a day long since; from, in domestic service, the highly ornate and scientific systems of indirect and semi-indirect lighting, and shaded and globed lamps on artistic fittings, back to the old inartistic globed flat flame; from the simple system of prepayment in modest sums for gas through slot meters, with all the attached conveniences for lighting and cooking in the homes of the working-man to the days of oil-lamps, candles, and coal for cooking; from the millions of gas-cookers now in use without polluting the air to the inconveniences of the old style of cooking; from the gas-fire to the ancient coal fire with its labour, dust, and serious atmospheric pollution; from the present-day quick methods of obtaining hot water by gas instead of the laborious and lethargic methods of the past; from the current methods of lighting churches, schools, and factories without eye-strain (where the fitting is properly done) to the dismal examples of lighting of the past; from the large application of gas in many institutions where reliability, ease of manipulation, and really good value are requisites to the days when these institutions had to perform their functions without them; and from to-day when the residuals of gas manufacture are indispensable to mankind, and add to his pleasures, to the days when those same residuals were little more than waste.

There we have progress, and remarkable progress, in the service of the gas industry to mankind, and a service in which, as efficiency has ascended by manifold strides, the cost of realizing it has descended. Progress in efficiency and price have moved in opposite directions. Expensive crudeness has been left behind, and progress has been made along the road where reward is in low-priced efficiency. This is all to the good, and to the stability of the gas industry; and it is all to the good of the community. This is the true picture lavishly spread before us at the National Gas Exhibition to which those associated with the industry

Photo. by MILES AND KAYE.

THE RIGHT HON. SIR DAVID BURNETT, BART.,

LORD MAYOR OF THE CITY OF LONDON,

Who will Open the National Gas Congress and Exhibition To-Morrow.

Photo. by ELLIOTT AND FRY.

SIR CORBET WOODALL, D.Sc., M.Inst.C.E.,
President of the Exhibition.

EDWARD ALLEN, President of the Institution of Gas Engineers,
Chairman of the General Committee of the Exhibition.

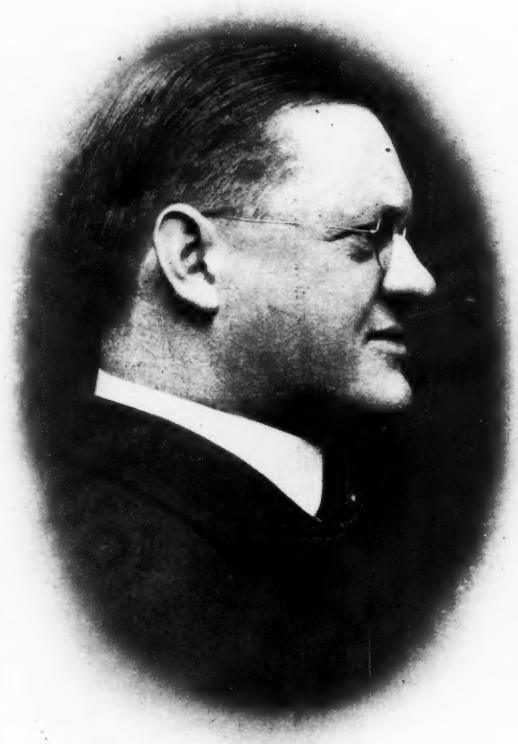


Photo. by HISTED AND CO.

F. W. GOODENOUGH,
Chairman of the Executive Committee of the Exhibition.

Photo. by LAFAYETTE.

H. M. THORNTON,
Vice-Chairman of the Executive Committee.

from all parts of the United Kingdom and Ireland, and the public from all quarters are invited, be those who can come friends or otherwise.

The Scene of the Exhibition.

The exhibition is not by any means difficult of access. The entrance is in the Uxbridge Road, close to the Shepherd's Bush station on the Central London Tube, the Uxbridge Road station on the Metropolitan Railway, and the Shepherd's Bush Terminus of the London United Tramways. Motor buses also pass the door; and visitors to London might note that the numbers of these buses are 12, 17, 20, 23, 44, 49, 50, and 70.

The Organizers.

Though many have assisted in providing the finances for the exhibition, and though there has been a General Committee to approve or amend the work of organization, the main part of the work has fallen upon an Executive Committee, constituted as follows:

Sir Corbet Woodall (*President of Exhibition*).
F. W. Goodenough (*Chairman of the Executive*).
H. M. Thornton (*Vice-Chairman*).
Edward Allen (*President of the Institution of Gas Engineers*).
J. Ferguson Bell.
H. N. Bickerton.
John Bond.
Mrs. M. A. Cloudesley Brereton.
T. S. Clapham.
Cyril Davis.
F. Templer Depree.
W. Doig Gibb.
J. William Glover.
Percy F. Holmes.
E. H. Hudson.
W. D. Helps (*Chairman of Council of Society of British Gas Industries*).
R. S. Hilton.
G. H. Pearson-Perry.
W. E. Price.
W. J. Sandeman.
R. G. Shadbolt.
Frederick Todd.
B. B. Waller.
D. Milne Watson (*Hon. Treasurer*).
Fred J. West.
H. James Yates.

A. A. Johnston (*Hon. Consulting Engineer*).
Walter T. Dunn (*Hon. Secretary*).
Radcliffes and Hood (*Solicitors*).
Septimus Warwick and H. Austen Hall (*Consulting Architects*).
F. W. Bridges (*Organizing Manager*).
Cash, Stone, and Co. (*Auditors*).

The brunt of the work has—the whole industry knows through the generous acknowledgment of his fellow-workers—fallen upon Mr. Goodenough. He has conceived, planned, and worked at the details of the enormous and extraordinary display, with skill,

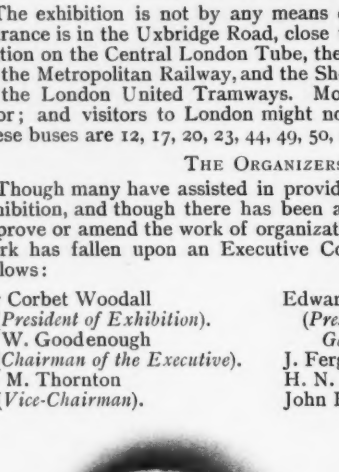
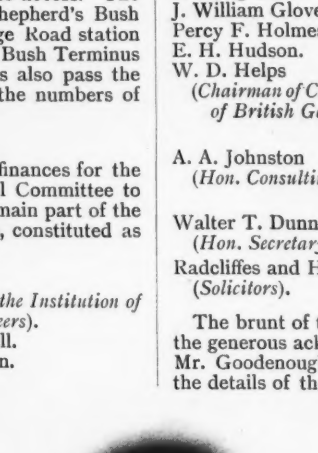
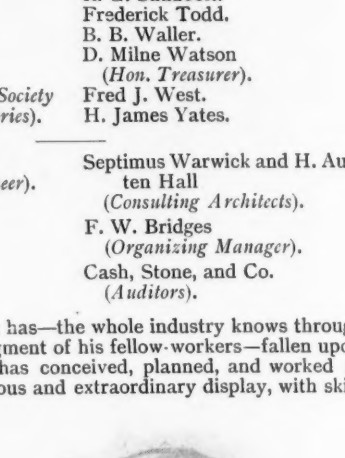


Photo by J. Russell and Sons.

PROFESSOR HAROLD B. DIXON,
President of the Society of British Gas Industries.



D. MILNE WATSON,
Honorary Treasurer of the Exhibition.



W. D. HELPS.
Chairman of Council of the Society of British Gas Industries.

patience, and tenacity that have only known the bounds of time. Even those who have been brought into contact with him during the preliminaries and the gradual creation of the vast entity from its thousands of component parts, can only realize in a more or less shadowy sort of way what it has all meant for him. No one in touch with him, no one of his co-workers, no one of those who have supervised the labour at the exhibition and have executed the actual work there, could resist the spirit of the chief among the organizers, or refuse to do his utmost in working loyally for him. In the consummation of the effective co-operative show, he is the man of the hour. There was nothing to guide in the work; for there has been nothing of the same kind carried out before in the way of a direct appeal to the public through a co-operative display—a display devoid of all trading element and trade individuality in making display. It is a demonstration; and its whole character has been maintained to the behoof of an industry as distinct from the units of that industry.

Photo by Tella Camera Co.

F. W. BRIDGES,
Organizing Manager.

Photo by J. Russell and Sons.

WALTER T. DUNN,
Honorary Secretary.

We ought not to omit to place on record that the Architects for the exhibition are Messrs. Warwick and Hall; the constructional work was placed in the hands of Messrs. Simmonds Bros., Limited, of No. 4, Newton Street, W.C.; and, as sub-contractors, Messrs. Mawers, Limited, of No. 221, Fulham Road, S.W., have carried out the furnishing. So far as we can judge, one and all have thoroughly interpreted the wishes of the organizers, and have turned the International Exhibition Halls from a scene of almost desolation and waste, into one of life, light, and practical lessons.

A Foreword—Especially for Contributors of Gas Appliances.

As a prelude to the description of the exhibition, a few words protective of ourselves ought to be written. This description is prepared with the intention that information as to the exhibition may be in the hands of the members of the gas industry on the morning of the opening day—to the advantage of the exhibition. At the time of writing—a few days before the opening of the exhibition, the work of preparation is not complete; and we cannot therefore speak in exact terms as to the work of decoration, nor as to the effects. We can only anticipate from what we know of the general scheme. In a co-operative display of this kind, too, where burners and gas appliances of many kinds have come from many sources, it has perhaps been impossible to collect the names of all the contributors of these fittings and appliances, and the points that they have equipped. We set out with excellent intentions to prepare this review, but have to confess that there may be failure in this one respect, though unimportant. With the hundreds upon hundreds of different connection points, with the hundreds upon hundreds of different lamps, domestic heating and cooking appliances, industrial appliances, and other things in which gas is used as the heating agent, we have found very difficult the task of completely listing everything and every firm. In the same rooms different makers' lamps and different heaters are used, in special

exhibits such as in the various cooking departments we should have to descend into what would be nothing but a catalogue of goods, and repetitions of makers' names, to mention everything. It would be dreary work and make dreary reading. But what we have endeavoured to do is to mention makers' names and their goods here and there in order to give them the prominence they deserve. Probably, however, they will never have public credit for every appliance contributed by the firms individually. It is not desirable that we should make this account complicated by repeatedly mentioning goods and names of the contributors. For instance, in the general lighting of the exhibition, in several places more than one maker is exhibiting, and, by writing alone, we cannot possibly explain which are one makers' lamps and which are those of other makers. Therefore the broad and general treatment we have had to adopt in this article must be accepted as being the best method under the circumstances of its preparation. At the time of writing, too, the exhibition has not been seen lighted up, nor have the myriad of heating appliances been at work; so that, in an article supplementary to this one, there will be something to say as to impressions, with references likewise to striking special points. With this statement, we will proceed to give as comprehensive an account of the display as opportunity allows us to make.

OUTSIDE THE EXHIBITION.

New Gas Device Work and the Latest in High-Pressure Lighting.

No one can miss the entrance to the chain of galleries in which the great exhibition is located. Particularly will this be the case at night time, when the visitors it is hoped will be very numerous, for then will be seen the best effects of the show. Whichever way one approaches the entrance—whether a straight cut is made to it across the road, or whether approach is made from either direction along the Uxbridge Road—after dusk, he will be attracted by the big display of high-pressure lighting, and the words "National Gas Exhibition." These latter will be seen under the centre entrance arch, and depending on a framework from the extreme height of the towers down to just above the line of the adjoining parapets. There will be no possibility of mistake. These "National Gas Exhibition" designs and lettering form quite a new departure in gas device work. The letters are in two parts—a red-faced back, and a black front, with space between, in which are fitted jet burners. After dusk when the devices are lit up, the letters in the case of the front sign simultaneously flash by the aid of a bye-pass situated at the base of each; while the side signs are lighted by a climbing bye-pass supply (which runs from the base to the extreme top) when the main supply is opened and the bye-pass is closed.

The main high-pressure lighting outside will comprise a feature that will be new to many even in the gas industry, excepting through the description that has already been published in the "Journal" [see Feb. 18 last]. Inside the crowns of the towers and hanging in clusters about the front are twenty-six 1500-candle power Keith high-pressure lamps fitted with silica cups round the mantles. This marks the introduction to the lighting world of this particular form of silica fitted lamp; and the display will, we are confident, arrest the attention of all visitors, for the lamps look remarkable after being accustomed to the ordinary globed ones.

Along the hoarding outside, there is also a display of three Pharos-Welsbach 4000-candle power high-pressure lights.

IN THE ENTRANCE HALL.

Passing up the steps into the entrance hall, where progress is barred by the turnstiles until the admission ticket is produced or payment tendered, we find that this has been prettily decorated. The hall (which is known as No. 1) will in part form a lounge; and one will stop to examine the lighting and heating arrangements. Over the turnstiles, there are half-a-dozen "Nico" (New Inverted Company) single burner suspension 300-candle power lamps. In the lounge section of the hall, the visitor will not fail to admire the four special pendant fittings which have been specially made for the occasion by Messrs. William Sugg and Co. They are beautiful examples of modern lamp work. The heating of the entrance hall is by four tube radiators, supplied by Arden Hill, Cannon Foundries, Davis, and Richmond.

IN THE INDUSTRIAL HALL.

(Gallery No. 2.)

A General Note.

Before proceeding, let us say that the general design of the exhibition is on broad and simple lines; and the impression that one has is that the decorations are merely a background to the exhibits which they help to show to the best advantage. Each department is differently treated, so that the design harmonizes with the exhibits; and the effect is splendid. Throughout the exhibition the gangways are 12 ft. wide, thus providing plenty of space for locomotion. The galleries, too, separated, so to speak, by their connecting annexes, have enabled a sectionizing scheme to be carried out with perfection.

A Busy Scene of Industry Demonstrating a Few of the Applications of Gas.

We are in the Industrial Hall. From to-morrow it is to be a busy scene. In front, to the right, and to the left of the visitor are gas-engines. Beyond, in the centre, are stands in which industrial operations are carried on; the same along the walls on the right-hand and the left-hand sides. The stands have large plain circular columns in front, with plain cornices, and plain connecting top members, and the columns are completed by gilded-top finials. There is an air of substantiality, neatness, and cleanliness over all this industrial section. The walls are distempered, with panels formed in stencilled designs of colour. The roof is hung with a coloured velarium; and it may be mentioned here that the whole of the roofs are similarly treated with suitable colours, producing a variation in the prettiness of the top scene.

The general lighting of the hall is by high-pressure lamps—twelve Sugg lamps and twelve Tilley lamps. At the end of the hall is a staircase leading to the arcade of shops; and, in line with the lamps in the main hall, are, on brackets, five more lamps on either side, of the same makes—Sugg's on the right and Tilley's on the left. The Sugg lamps are of 600-candle power, half with opal screens. Of the Tilley lamps, nine are also of 600-candle power, fitted with opal glass screens, and the other eight of the same power. These lamps are all fitted with automatic distance lighters, by which a low-pressure pilot light is kept burning when the lamps are not required. As soon as the increased pressure comes on, a long flame is flashed to the main burner, lights it, and then the pilot is extinguished. On the high-pressure being shut off, the pilot relights.

Gas-Engines, Compressors, and Electricity Generating Plant.

Let us retrace our steps to the beginning of the hall, where gas-engines large and small are seen, showing the utilization of gas, &c., for power purposes—generating electricity, driving compressors, pumping water, charging electric accumulators, driving shafting, &c.

Centrally situated is a fine collection of the National Gas-Engine Company's engines—all running, some driving compressors, and others running without load. The engines are of the latest designs in the following types: Two "J" type (connected to Keith-Blackman gas-compressors), and one each of the "F," "M," "H," and "P" types. The stand has upon it a Ewart radiator and a Fletcher cooker.

The compressors supplying the high-pressure silica lamps over the entrance to the exhibition and certain of the inside high-pressure lamps are fitted to the National engines. There are two Keith compressing-machines, each of 2000 cubic feet capacity, and direct-driven. The pressure at which the silica lamps burn best is 80 inches water column, or (say) 3 lbs. per square inch. A Bryan-Donkin compressor is also observed.

The first stand on the right-hand side bears the well-known name of Crossley Bros. It is brilliantly lighted by eight Tilley Bros. 150-candle power single burner high-pressure lamps; and on it are noticed a Main "St. Magnus" radiator and one by Wright, with a small Vulcan cooker. The exhibit demonstrates electricity generation and gas and air compressing for various industrial purposes—for instance, gas for mantle making—and the high-pressure lamps on the stand are supplied from the same source. The engines shown comprise new type ones, ranging in power from 7 B.H.P. to 72 B.H.P. The latter engine is seen belt-driving a Lancashire dynamo, which supplies energy to motors for various purposes. This engine is representative of a long range of the firm's production up to 300 B.H.P. The symmetrical arrangement of the breech end, the vertical arrangement of all valves, and the strength of the proportions are features. Another engine is of 16 B.H.P.; and this is illustrative of the sizes up to 62·5 B.H.P. Two other engines of 7 B.H.P. and 12½ B.H.P. are shown working. The larger of these is fitted with electric ignition, and is used for driving compressors for high-pressure air supply in the industrial section.

Both of the compressors referred to are of the Keith type—the one supplying gas is of the "D" size belt-driven pattern, and has a capacity of 4000 cubic feet per hour; the gas being supplied at 4 lbs. pressure. The other compressor which is furnishing high-pressure air, is of the No. 4 type, belt driven, and has a capacity of 10,000 cubic feet. As a point of interest, it may be added that this No. 4 machine is made specially for supplying high-pressure gas for industrial purposes. It is much cheaper, and (be it noted) much smaller, than the well-known Keith compressor, which is usually employed for supplying gas for lighting purposes.

Passing over to the other side, there will be noticed exhibits by Messrs. George Waller and Son, Messrs. Tilley Bros., and the Welsbach Company. Messrs. Waller and Son have supplied three small Pinkney gas-engines, of ¼, ⅓, and 1 horse power, also a ¾ B.H.P. gas-engine driving an electricity generating set for charging accumulators, driving ventilating-fans, lighting garages, and for similar purposes. Burners, globes and pendants, with a "Ruler" lamp fitted with opal reflector, are supplied by the Welsbach Company. Tilley Bros. show, among other things, a 1000 cubic feet per hour compressor fitted for belt driving, automatic lubricator, and an arrangement for adjusting pressure while the compressor is running, for any pressure between 20 inches and 120 inches. The same firm, among much else, show tinmen's stoves, which require a low consumption of gas. Radiators are found on this and other stands. The Premier Gas-Engine Company are supplying photographs for a screen, illuminated by low-pressure lamps.

A working gas-engine exhibit is also supplied by Messrs. Bilbie,

Hobson, and Co., who are the agents for the Stockport gas-engine. The exhibit consists of three engines—a 63 B.H.P. working load, a 16 B.H.P. working load, and a 6 B.H.P. working load, of their standard types. The 16 B.H.P. engine is seen driving shafting and tools in the neighbouring apprentices' shop. Some of the points to which the makers would like attention directed are that in these engines for driving factories, special consideration has been given to simplicity in design, with facility for taking apart for cleaning and adjusting. Except the actual valves themselves, practically no parts are hidden. The lubrication is automatic and continuous, to enable the engine to be run for long hours without stopping to oil-up. The engines are fitted with low-tension magneto ignition. The sparking-plug is fitted in the cylinder end, so that the sparking terminals are swept by the incoming mixture of gas and air—thus ensuring an easy and certain start and positive and regular firing. Also noticed on the stand is a "B. S. T." gas compressor for high-pressure lighting and heating purposes. This system has been specially designed by Messrs. Thorp and Marsh for mills and factories. The pressure adopted for factory purposes being only about 8 inches, enables the lamps to be lighted before the blower starts; and a bye-pass arranged on the blower eliminates the danger of the lights going out if the motive power driving the compressor stops from any cause. A Cannon Foundries four-tube radiator and a small cooker are noticed here. Hereabouts too is seen lighting by Sugg and Welsbach lamps.

The Model Engineering Company supply a hot-air water-pump and a table fan.

In these gas-engine exhibits, we have the basis of industrial operation—power. We see the gas-engine used for raising the pressure of gas for giving enhanced efficiency for high-power lighting units, and greater flame temperatures in heating operations. We see it employed for compressing air, and for air-blast purposes in industrial gas heating. We see it used, too, for the generation of electricity on large and small scale. The boundaries of the gas industry are ever and ever extending; it acknowledges no limitations.

Next in order we are confronted by a few—and only a few for illustration purposes—of the applications of gas to industry.

Printing by Gas.

Succeeding the National Gas-Engine Company's stand, in the centre, are some moving photographs; and then we have a central stand, occupying a space some 32 feet by 22 feet, which is in the occupation of Sir Joseph Causton and Sons, printers. There the firm are making a popular display of printing picture postcards, and of "composing" by monotype machines. The equipment consists of a 7 horse power "National" gas-engine, an iron slab, a metal melting pot heated by gas, a moulding box also heated by gas, three benches, three machines driven by gas, and two monotype machines. The high-pressure duplex burner used in connection with these machines is one of Tilley Bros.' specialities; a feature being low consumption, with protection of the burner from falling metal. The stand is lighted by four Welsbach high-pressure lamps.

Meter Making and Testing.

The next stand in the centre is also a busy one; for here several men are engaged in making dry meters, and adjoining there is a meter-testing plant. The men in turn are being provided by the following manufacturers: Messrs. Alder and Mackay, Messrs. J. & J. Braddock, the Gas-Meter Company, Limited, Messrs. George Glover and Co., Limited, Messrs. Thomas Glover and Co, Limited, Messrs. R. Laidlaw and Sons, Limited, Messrs. Parkinson and W. & B. Cowan, Limited, Mr. William Smith, Messrs. Willey and Co., Limited, and Mr. George Wilson. The various stages through which the dry meter passes from the "raw" material to perfected measurers of gas will be demonstrated. The lighting of the stand is by Bray, Hands, and the Helm Lamp Company.

Most of the makers are exhibiting meters which will either be on view on the stand, or in other parts of the exhibition. For example, the Gas-Meter Company have sent two glass-cased dry-meters—one of which is fitted on the meter stand, and the other is elsewhere in the exhibition. They have also supplied a high-pressure meter, with patent compensating dials, reading both the actual measurement of the gas passing at the high pressure, and the same reduced to atmospheric pressure. The meter is adjusted by means of change-wheels to correct the volume for any given pressure, and has no mercury or compensating attachment. For the satisfactory use of gas at high pressure, the pressure must be kept practically constant; and as a consequence the actual variations encountered are so small as to have no appreciable effect on the corrected volume. A slot-meter in glass case is shown by Messrs. George Glover and Co., Limited; and one is also exhibited by Messrs. Thomas Glover and Co. Situated in another part of the exhibition, Messrs. Alder and Mackay are exhibiting one three-light glass show prepayment meter with glass divisions, which enables one to see right through the meter. On another stand is one of the firm's "Demonstration" meters for show-room purposes, fitted with a flat-flame and an incandescent burner, by which is illustrated the difference in light passing the same quantity of gas per hour. This meter also gives the number of hours for a penny equivalent to the cost of gas per 1000 cubic feet, the quantity consumed, and the cost of gas per hour in pence—all worked out to decimals. The meter may be used for testing the consumption of gas-fires. The firm have also two 9-inch circular copper pressure gauges and two pressure registers complete with glass shade, fitted in other departments of the exhibition. Messrs. R. Laidlaw and Son have on view on the stand a 2-light ordinary dry meter, in the cookery demonstration-room a 5-light show prepayment meter, and in the apprentices' shop a 3-light show prepayment meter. Mr. William Smith is also showing a 3-light glass-cased slot meter in the meter section. In the cookery demonstration-room, Mr. George Wilson has a 5-light glass-cased dry meter. Messrs. J. & J. Braddock have a glass-cased meter on view; and Messrs. Willey and Co. are showing a 30-light glass fronted meter, as well as a 5-light slot meter in glass case. After writing the foregoing, we learn that Messrs. Parkinson and W. & B. Cowan have placed on view a show slot meter in glass case and two dry meters. Hutchinson Bros., Metropolitan Gas Meters, Limited, James Milne and Son, G. Orme and Co., Pinchbeck Limited, and Sawer and Purves are also co-operating in the exhibits, or in other ways.

Mr. H. Mitchell, the well-known maker of meter locks is exhibiting a showcase of rustless slot-meter locks of the following descriptions: The "M. & M.;" the "Dovetail," with patent key and keyhole; the "Back Gripper;" the "British Fort;" the "A. & H.;" and the "Backfast." There will also be seen the "Shackleless" rustless slot-meter lock, samples of stamped steel meter money-boxes, with patent locks, and fittings for locks. The latest patent is the "Backfast." This is locked from the back of the box, instead of the front, as hitherto.

A Combined Industrial Exhibit.

Turning now to the side bays, next to Crossley Bros.' stand, there is the combined industrial section. The stand is lighted by half-a-dozen 100-candle power high-pressure factory lamps by Tilley Bros. Here we have a very large collection of industrial heating appliances; and yet they are only representative of numerous other forms. Recognized are the makes of Messrs. Fletcher, Russell, and Co., Messrs. John Wright and Co., the Richmond Gas Stove and Meter Company; and the Gaslight and Coke Company have made a contribution. Crucibles, drying-ovens, blast-furnaces, ordinary furnaces, muffles, salt-bath, melting-pots, forges, natural draught surface combustion furnaces, rotary blower, branding iron, high-pressure burners, soldering pieces, glue-pots, and other things are observed (too numerous to make note of) for all sorts of trades and processes in which good constant heats are required. We should like to describe each exhibit, but space and time forbid the attempt.

Steel-Hardening Shop.

Next door is a steel-hardening shop, fitted with furnaces, &c. This is illuminated by two of Tilley's 100-candle power high-pressure factory lights. The steel-hardening exhibit is being run by Messrs. Sanderson Bros. and Newbould, Limited, a well-known steel manufacturing firm of Sheffield. This hardening shop will be equipped with a Richmond oven furnace and an oil tempering furnace. The former will be used for case-hardening, re-heating, and hardening, and the latter for tempering in oil. The shop is also fitted with water and oil boshes, bench, and apparatus for breaking the steel to show the fractures after the steel has been subjected to the different heat treatments. Messrs. Sanderson Bros. and Newbould, Limited, are sending to the exhibition one of their expert hardeners, who will work the hardening-shop, and demonstrate to those interested the process. The hardening-shop will prove to be a very attractive exhibit.

Mantle Making.

The next stand will also be a popular one. There three of our well-known mantle-making firms are, in turn, going to demonstrate how from the raw material finished mantles are produced. Some of the regular girl hands of the three firms will carry on the demonstration. The burning-off frames are being supplied by high-pressure gas. The lighting is by Kempton's low-pressure lamps. The three firms whose employees will occupy the stand at different periods of the exhibition are the Voelker Company, Welsbach Company, and Messrs. Curtis's and Harvey. A mantle-testing machine has been supplied to the stand by Messrs. Thomas Glover and Co., Limited.

Training Shop for Gas-Fitter Apprentices.

Passing to the other side of the hall, next to the "Stockport" engine stand, is the Apprentices' Training Shop; and this will show the public how thoroughly the modern apprentice to gas-fitting is trained in an up-to-date gas undertaking for rendering good service both to the employing concern and to the public. The day of the old order of fitter is passing; the new order of things, and the multifarious uses of gas, demand technically trained men. In such shops as this, the gas undertakings are educating their boys up to a higher state of efficiency. The stand will be the centre of great attraction to see how the lads work. The shop is fitted with lathe, emery-wheel, drilling-machine, screwing-machine, a forge, pipe-bending machine, tinman's stove by Tilley, brazing-forge with blow-pipe. A cooking-stove is also fitted here. The power and heat will, of course, be supplied by gas. The general lighting is by Smith's "Silva" two-light lamps and by Bland's low-pressure factory lights; over each bench and machine there are small local lights. A boiling-ring and cooker are provided by Sugg.

For the use of the apprentices, a "Victor" automatic hot-water apparatus, with supplies laid on to sinks, has been provided. This

is a special form of the new "Victor" combined apparatus, being rectangular in shape, with all the connections confined to the width of the storage. The over-all width is 14 inches, the height 42 inches, and the depth 12 inches, forming 20 gallons of storage. In flats and other small properties where the space is limited, this design is often of great advantage. In action, the general principle of the apparatus is the same as that of the "Standard Victor" system, with cylindrical tank above the boiler, as the boiler proper is quite independent of the storage with distinct flow and return pipes; the former delivering the circulating water to the top of the apparatus, so that hot water at about 140° Fahr., in small quantities, is available without waiting for the whole to be heated. The patent cut-out valve system is provided, allowing only one-half the tank to heat when required, thus ensuring the utmost economy in use.

Aluminium Foundry.

In the succeeding bay, Mr. Coan will be demonstrating the casting of aluminium. The stand is fitted by a Wright's tilting furnace, and troughs and moulds, all gas heated. The lighting is by two Bray low-pressure factory lamps.

Enamelling and Annealing Shop.

In this bay the above work is to be demonstrated. The different furnaces are by Fletcher, heated by low-pressure gas and compressed air. The lighting is by two one-light low-pressure lamps by Falk-Stadelmann.

Laundry Work by Gas.

We are afraid the interest in this Industrial Section right at the beginning of the extensive show will monopolize much time and attention from the visitors. Nothing is being left undone to interest and to educate. A busy place will be the laundry; and the operatives in it, coming from Messrs. Spiers and Pond's laundries at Battersea, will acquit themselves in a manner that will do justice to their employers, the machines they will control, and the irons they will handle. The laundry has been equipped entirely by Messrs. Keith and Blackman. High-pressure gas is used in the heating of the laundry irons, and for running the various machines. Two compressors installed raise the pressure of the gas for the machines, and illustrate the type of compressor that is usually employed for laundry work—viz., the "1A" size and the "A" size. These are driven from a countershaft; the power being supplied by a small gas-engine by Messrs. Bilbie, Hobson, and Co. One feature of the exhibit will be found in the Keith irons. There is also exhibited for the first time some low-pressure irons which have been introduced by Messrs. Keith and Blackman, and which, we believe, have a good future. Certain it is they are worth examination.

The laundry is lighted by four high-pressure factory lamps; and two radiators by Richmond are fixed.

Illuminated Signs.

Before passing up the flight of steps from the machinery hall, "F.O.S." signs are noticed on either side, by the Universal Light and Sign Company, Limited. These gas-signs will be found in many parts of the exhibition, and they are directive and informative. The same firm have shops in the arcade where there is further demonstration made and information given concerning them. Over the entrance and exit of each section, a large "F.O.S." gas-flash sign is erected, denoting in the most practical manner, the nature of the section about to be entered by the visitor. It might be said that no matter in which part of the exhibition one may be, it is possible to see one of the "F.O.S" signs at all times. The Lecture Room, the Cookery Hall, the Exhibitors' Club, the Restaurant, the Tea Rooms, the Rest-Rooms, &c., will all have their "F.O.S." sign, and every "Exit" is provided with one. In addition to the large number of signs supplied, there is a very comprehensive display of "F.O.S." flash signs to be seen in the shops allotted for the purpose of demonstrating the suitability of gas for advertising purposes. Signs to suit a vast variety of businesses can be seen there in working order; and we strongly recommend every gas manager and engineer to make a point of inspecting the display. In all, we believe, the Universal Light and Sign Company, Limited, have erected some seventy "F.O.S." signs in various parts of the buildings; and this is, without doubt, the largest display of gas-signs ever exhibited under one roof. Many really striking novelties, designed specially for advertising gas, are to be seen.

In other parts of the exhibition, the Ramsay "Flashomotors" will also be guiding visitors to offices, &c.

The Richmond Company are showing a patent flash-meter, as will be seen in the course of the general description of the shopping section. It may be mentioned that since its introduction this device has proved most popular and reliable in action. The size on view at the exhibition is No. 2; but it is made in smaller size for operating with one or two incandescent burners.

The Arcade of Shops.

Looking up the steps, a pretty sight meets the eye. The decorated and arched entrance to the shopping arcade is very attractive, and a fine effect in the arcade itself has been obtained by a pretty pink and white archway of muslin. The steps are ascended. At the top one must turn for a moment to get a view over the machinery and industrial section. The animated scene will naturally cause reflection as to what it all portrays, in relatively small form, for the gas industry—what it portrays for it in the matter of scope in its relations with the great industries external to itself. It all symbolizes something vast, and something potential.

We turn to the arcade of shops. We have seen industry and production; and now here we have representation of the places from which the products of industry are retailed and distributed. But the object of the shops is to demonstrate the lighting and heating of such places; and to do this shop fronts have been properly fitted, as well as interiors, so that the lighting is shown under realistic circumstances. The organizers of the exhibition kept rigidly before them the idea of the value of an approximate reality in demonstrating gas lighting and heating. The general lighting of the arcade (which is 114 feet long) is by five high-power low-pressure "Nico" lamps, fitted with octagon reflectors with opal panels.

On each side of the arcade, there are nine shops. The two first shops on either side at the top of the stairway will show specimens of the bye-products of gas manufacture and aniline dyes in the windows. The organizers did well in selecting these two shops for this purpose; for with top and bottom concealed lighting, by Falk, Stadelmann, and Co.'s and J. & W. B. Smith's reflector fittings, and the many coloured products in the windows, from whatever position they can be seen they look very pretty and attractive. Single lamps are provided by Hands and Welsbach.

Following on the right-hand side, the second shop is devoted by H. Harper and Co. to gold letter mounting by the aid of gas. It is lighted by four Sugg factory lamps, and heated by a 10-inch Parkinson "Spartan" gas-fire. The third and fourth shops are occupied by the Universal Light and Sign Company, Limited. One is an open shop, and the other a closed one, with signs fitted up all round the walls. In one of these shops are a Sugg ventilating lamp and a 10-inch "Palermo" fire supplied by Fletcher, Russell, and Co. The fifth shop is a drapery establishment, occupied by Messrs. Marshall, Roberts, Limited, the well-known drapers of Camden Town, whose large premises there are lighted entirely, inside and outside, by Keith lights. At this exhibition shop, the lighting is by three 1000-candle power Keith "Silica" lamps outside, and two 300-candle power lamps inside. There is also an Arden Hill radiator here. The sixth shop is taken up by Avery's with a photographic exhibit. In the centre is a three-light Helm inverted pendant, and a three-light pendant by Hands with a Pneumatic Lighting Company's switch; and the heating is by a Cannon radiator. The tenants of the succeeding shop are the British Commercial Gas Association, who are using it as an office and inquiry bureau. This is fitted with Helm and Sugg lamps, and the heating is by a 10-inch Wilson fire. In the next shop, there is an interesting loan collection of ancient lamps and fire making appliances. The lighting is by a two-light inside Bland lamp and Willey's bracket lighting. The "places of business" on this side are completed by a newspaper and book shop; the system of lighting in this case being by a two-light inverted pendant and a Pneumatic Lighting Company's switch, a lobby lamp, and two three-light Hands outside lamps, with heating by a radiator.

Returning to the bye-products shop on the left-hand side, it is seen that the Sulphate of Ammonia Committee have entered into the tenancy of the succeeding one for use as an inquiry office. It is lighted by a Podmore three-light ventilating lamp in the centre, and is heated by a 10-inch Cannon "Iris" gas-fire. Diagrams on view, illustrative of the rise, progress, and work of the Committee, are supplemented by photographs of produce grown with sulphate of ammonia. An extensive collection of manures, with their compositions and the proportion to be used for farm and garden crops is staged; while the results of the manures are set out in the literature published by the Committee. The neighbouring shop is occupied by enamelled work and jewellery, being illuminated by four Bray top reflecting lights, six bottom reflecting ones, and a flash sign, worked by Richmond's flash-meter (previously noticed in this article). A two-light Podmore pendant is also fixed. Mr. Alexander Fisher occupies the fourth shop on this side as an enamelling studio. This is illuminated by four one-light Bland pendants, and a bracket light (by the same firm) specially to illuminate a beautiful piece of Mr. Fisher's work. A "Quadra" fire of the Imperial Stove Company is seen here. Aluminium ware is being exhibited in the next shop, which is lighted by four outside Edgar lamps and a lobby light and one Bland light inside. The next shop has been set apart as a writing-room. Five brass table lamps, with "Nico" burners and green silk shades, are provided here, together with three Ingram and Kemp two-light candle brackets, with green shades. The room is also heated by a Main gas-fire. The seventh shop is a post, telegraph, and telephone office. The counter is fitted up with two pillar or bank gas-fittings (Sugg), with a bracket for a writing desk for telegrams. There are also here three-light Sugg ventilating pendant lamp with distant control, and a lobby lamp. The heating is by a Fletcher "Forester" radiator. The next shop, like the one opposite, is occupied by a further part of the loan collection of ancient lamps and fire-making appliances. We have here the illumination by a two-light suspension lamp in the centre, and a three-light lamp placed centrally outside the window. The last shop on this side is Fuller's chocolate shop. This is illuminated by two three-light Kempton outside lamps, a lobby lamp, three lights inside, and two lights in the window. The heating is by a Fletcher "Ivor" radiator.

In this arcade, there is demonstrated a variety of means of illuminating shops according to requirement. Most shopping districts represent a dissimilarity of lighting, and some of it most

unsuitable. This arcade represents a variety of suitable means of lighting; and there will be in it especial interest for tradesmen, who will see how shops can be both attractively and economically illuminated, with lights that are not overpowering to the eyes, and lights that are suitable for showing goods in their natural colours.

Loan Collection of Ancient Lamps and Fire-Making Appliances.

As will have been remarked in the foregoing, two of the shops are occupied by a loan collection of ancient lamps and fire-making appliances. This is a collection of considerable interest, and provides much illustration of the early evolution of lighting and heating by artificial means. To the Corporation of the City of London there is great indebtedness for the loan of exhibits, as well as to several private collectors. In connection with the history of fire-making, Mr. Edward Bidwell has supplied valuable specimens, models, photographs, &c., which illustrate ancient mechanical methods of fire-making, optical methods, electrical methods, and chemical methods. Mr. Edward Lovett sends a number of specimens from his Folk collection, illustrating the origin and development of the oil-lamp. Primitive lamps have also been lent by Mr. F. W. Reader. All the lamps that he has contributed, except two, have been found in tombs. The Roman and later lighting appliances kindly lent by the Corporation of London are from the celebrated collection in the Guildhall Museum. Most of these lamps have been found in London during excavation work. In this collection from the Guildhall, there are also candlesticks of the Sixteenth Century, and rushholders and hanging candlesticks of the Eighteenth Century. There is also a collection of Foreign and English snuffers by Mr. Edward Bidwell. In the catalogue, there will be found an interesting introduction to these exhibits by Mr. Miller Christy, F.L.S.; and in arranging and cataloguing the exhibits, the Exhibition Committee have received willing help from Mr. B. Kettle, the Librarian at the Guildhall, and Mr. Frank Lambert, his assistant. The numerous examples of the early crude methods of lighting in the midst of the great wealth of illumination by modern gas-lamps renders more striking the advances of civilization that the exhibition demonstrates.

PICTURESQUE HOMELAND.

(Gallery No. 3.)

Emerging from the shopping arcade, the visitor comes on to one of the prettiest pieces of scenery in the whole exhibition. The blue muslin drapery under the roof diffuses in the daytime a subdued appearance over the scene—a scene of many colours. We have the idea here of a rural court; and a sense of enclosure at this point has been aimed at. It affords at the same time a good circulating area. The centre is occupied by a charmingly devised exhibit by the Sulphate of Ammonia Committee, to demonstrate the value, in producing heavy crops in agriculture and rich blooms in horticulture, of the fertilizer that is a subsidiary commodity of gas manufacture. We will describe this exhibit more freely presently. On the right-hand side of the space is a country cottage, and on the left-hand side a more imposing suite of rooms, occupying the centre and sides of the hall, and demonstrating the gas equipment of a town house or a flat. The whole of the rooms have been furnished and decorated in a complete manner, illustrating as, in one's own home, the many pleasant and utilitarian uses of gas, and the proper methods of installing it.

The Architects (Messrs. Warwick and Hall) have done all their work thoroughly well; the builders and decorators (Messrs. Simmonds Bros., Limited), have carried out their views with care and, so far as we can judge, with precision; and Messrs. Mawers, Limited, the furnishers of the different model dwellings, have brought their knowledge to bear upon their part of the work, and have placed artistic and high-class furniture where one would expect to meet with it, less imposing furniture in the representative rooms of the middle-class house, and plain furniture in the poorer rooms representing the home (say) of the artizan class. The firm we ought to mention—in fact, it is only fair to them to do so—have been much restricted in their treatment of the rooms, owing to space, and to the number of representative gas-using appliances it was desired to instal in them. But so far as the firm could go, they have attempted to provide in the furnishing suitability and to avoid incongruity. In a scheme of this kind, one feels that the furniture may subordinate the gas side of the display; but what are the gas lighting and the gas heating appliances there for, if not to show their applicability to all classes of rooms, from the richly decorated homes of the wealthy down to the humble abode of the working man. The decorations and furnishing must be in conformity with the object of demonstration, or there would be failure in realizing the object. These points should be borne in mind by those who, without thought, are tempted to adversely criticize.

The Country House.

This occupies the whole length of the right-hand side of the enclosure. It forms an exceedingly pretty picture, with its veranda, entrance, bay windows, and greenhouse, all at once within the range of the eye. The building occupies the full width of 71 feet of the gallery. There is first the greenhouse; and following are the bedroom, kitchen, sitting-room, store, and washhouse. All the rooms are prettily decorated, and furnished in antique oak of the Jacobean period. One gets here the full sense of the quiet of rural environment.

The greenhouse (which is furnished by plants) is lighted by a Sugg ventilating-lamp; and Main's greenhouse heater is the one employed.

Entering the bedroom, a pretty scene confronts. There is an old oak bedstead, and a Jacobean chest of drawers, with other furniture in keeping. On the floor is a woven hair carpet, which is a floor-covering that is now much sought after. The lighting is by an armour-bright bracket and pendant by the Welsbach Company—the bracket-burner being fitted with a silk shade. The heating is by one of Wright's "Arch Druid" fires, finished in French grey, and fitted with a Larkin boiler; while the ladies will be pleased to notice here and elsewhere that provision is made, by means of a Clark stove (Richmond Company), for the heating of curling-irons.

In the kitchen, there is the plain usual furniture. The gas equipment is perfect. The room is lighted by a bracket-burner; and the gas cooker has also a bracket-light over it. Means for cooking and hot water supply are provided by Potterton's patent "Queen" combined gas and coal range, working in conjunction with a 28-gallon cylinder, placed at the side of the chimney breast. The "Queen" range is fully equipped in every respect, performing all the duties of the best separate gas and coal burning appliances in oven-cooking, hotplate cooking, and water-heating. Cannon Foundries have also supplied a griller on a stand. There is also a Richmond geyser fitted up for hot water supply. Provided also is an improved three-compartment steamer by Richmond. This is a complete cooker in itself; and, as each compartment is under separate control, there is no mixing of flavours. The same firm have supplied an "Elbard" patent toaster, which can be used with equal success in toasting bread either over the hot-plate burner of a cooker, or with an independent boiling-ring. The device heats up almost instantly; and as four pieces of bread can be toasted at one time, it is most economical in use. There is also a coke-boiler here by the Phœnix Supply Company.

The veranda is lighted by J. & W. B. Smith with a very pretty lamp.

The sitting-room is neatly and suitably furnished with a Jacobean dresser, side table, chairs, and gate-leg table; the floor is covered by rush matting. Casement curtains cover the bay windows. The lighting is by a "Surprise" pendant supplied by the Welsbach Company—in oxydized copper, and fitted with silk shade. There are also two artistic bracket-burners; and the heating is by a 10-inch "Vulcan" fire.

The wash-house it is noticed is supplied with a Welsbach bracket and burner for lighting, a Richmond wash boiler fitted with a draw-off tap and white enamelled cast-iron pan, a Davis condensing stove, and a Fletcher iron.

Sulphate of Ammonia Committee's Exhibit.

Turning to the attractive display of the Sulphate of Ammonia Committee, there must first be a word of compliment, for it is an exceedingly interesting and convincing exhibit. It is divided into a produce exhibit and a flower garden—being illustrative of the propaganda work carried on throughout the British Isles. There are in it four main sections: (1) Lawns and Flowers, (2) Vegetable Garden, (3) Farm Crops, (4) Orchard and Stackyards. The flower garden consists of a lawn, brought to perfection by the use of sulphate of ammonia, and surrounded with flowers, while the centre pergola is decorated with flowers, fruit, and other produce, grown by the aid of sulphate of ammonia. Among the crops shown in a growing condition, may be mentioned strawberries, celery, onions, leeks, lettuce, cabbage, tomatoes, and beet—all showing very clearly the benefit derived from the use of sulphate of ammonia. The farm produce has been brought from many parts of the country, and is illustrative of the results obtained by the Committee during the season of 1913. Among the most interesting are: Cereals, both growing and in sheaves, from Norfolk, Somerset, and Cheshire; grass plots from Yorkshire; mangels from the Harper Adams College, Shropshire, and from many other counties; cabbages grown by Sir E. Hambro, Dorsetshire; swedes from the estate of Sir Lionel Phillips, Bart., Hants; and sugar beet from the Committee's Norfolk experiments. Comparative exhibits of apples and pears show how the crops may be improved by the judicious use of sulphate of ammonia, while the miniature stacks of hay and corn are illustrative of the results obtained in various parts of the country from the hay and corn experimental plots. Visitors will particularly notice the paths, which consist of crushed clinker bound with tar, while the edge is composed of similar larger material. Gardeners would do well to consider this effective and cheap means of laying out garden paths through which weeds cannot penetrate. Materials for this work can be obtained from almost any gas-works.

On the right-hand side of the hall (close to the exit to the Uxbridge Road station) there are some moving pictures. To the right and left of the hall there are also fixed (and working) a couple of Ramsay's "Flashomotors."

General Lighting of the Hall.

Before describing the rooms constituting the town house or flat, a few words may be opportunely inserted here as to the general lighting of this particular hall, as it will be inconvenient to introduce the subject elsewhere. The general lighting of the enclosure occupied by the Sulphate of Ammonia Committee and the circulating space between it and the country and town house

is by means of four Keith 1000-candle power "Silica" lamps, which (as already said) are one of the novelties of the exhibition. The corridors running between the rooms constituting the town house or flat are lighted by low-pressure lamps; and here we get some illustrations by the New Inverted Company of oxydized pendant lighting on the semi-indirect principle, as well as antique bronze fittings on the same system by Ingram and Kemp, as well as antique copper and brass lanterns by the Bland Syndicate. Succeeding the town house is the band stand; and the surroundings are lighted by low-pressure lamps, divided between various makers—Podmore and Co., the Bland Syndicate, and Falk Stadelmann. There is the public way again on each side of the rooms beyond; and these are each lighted by low-pressure half lamps by Bland and Sugg. From these corridors, one comes out on to another open space, which is illuminated by four Sugg low-pressure inverted lamps.

Notwithstanding the reliability of gas supply, it may be mentioned that, at the desire of the London County Council, the whole building has been piped for an emergency supply from a distinct main. The general supply is by the Brentford Gas Company; and the emergency supply has been taken from the nearest main of the Gaslight and Coke Company. So that in all the principal parts of the buildings and corridors there is found provision for duplicate general lighting.

The Town House or Flat.

Returning to the enclosure at the beginning of this gallery, the inspection of the large town house may begin. With it, visitors will be delighted. In this homeland section, the large town house is, of course, the *piece de résistance*. It demonstrates the application of gas amid the most sumptuous surroundings, showing that for lighting and heating (apart from its comfort and convenience in other domestic service) gas can be, and is, utilized to minister not only to efficiency and economy, but to artistic merit. Under the circumstances of the exhibition, the visitor will indeed be hypercritical (or an opposing commercial bigot) if he has aught to say of a disparaging nature regarding this special exhibit and demonstration.

Occupying the centre of the space allocated to the exhibit (which is all on the ground floor, so that there is no crowding up and down stairs as there would have been if there had been a desire to complete the realistic side) are in order the conservatory, the drawing-room, the hall, and the dining-room.

Beautiful plants and foliage greet the visitor to the conservatory, which is furnished and fitted up in a manner that looks as though it was a permanency. It is really charming, and it demonstrates how a conservatory may be heated by one of the several methods which gas offers. In this case Wright and Arden Hill hot-water four-loop radiators are employed, connected to one of Wright's "Califactors." A four-burner Sugg ventilating-lamp supplies light.

The visitor steps into the drawing-room. It is at once seen that gas-fittings can, and do, harmonize with the best of room decoration and furnishing. Many visitors will wish that what they see here could all be transferred to their own homes; and, of course, it can be reproduced. The scheme of furnishing is in keeping with the decoration of the room. The furniture carries thoughts to past days—Mawers, Limited, having a reputation in connection with the transference from the artistic past into present-day life of work of the kind of which we have representation here. And the gas lighting fittings and heating appliances take their utilitarian place among it all with perfect ease in the matter of congruity, and so of unobtrusiveness. Here is a magnificent cabinet of the Chippendale period. A carved mahogany Adam settee is as graceful as useful. An inlaid satinwood commode is an ornamental piece. There are easy chairs in silk. The floor is covered with parquet linoleum and Persian rugs. This is, generally, the exquisite environment in which gas shows itself perfectly at home.

Chaste and artistic are the lighting arrangements in this beautiful apartment. There are high-class fittings here, splendid examples of the metal-worker's art. Six two-light lacquered gilt brackets, with Rose du Barry shades and white blocks, by Ingram and Kemp, claim notice; a standard lacquered gilt lamp, with shade, by the same firm; and an "Ormolu" one by Falk, Stadelmann, and Co. These are all fine pieces of work. In the ceiling is a ventilating-lamp, with cut-glass bowl and distant control, by Sugg. There are also table-lamps by Falk, Stadelmann, and Co. and Ingram and Kemp. There are plenty of means here for the provision of light. The ornate armour bright "Kenilworth" fire graces the room, and testifies to the work of John Wright and Co.

The hall again is in keeping with a large town house. The hypothetical owner of this hall has good taste in the "household gods" that he collects about him. Here we have a striking red cabinet on a gilt stand of handsome workmanship, and a very fine (blue lacquered) grandfather clock. A Chippendale centre table is, with some grandfather chairs, in the Queen Anne style, and two other chairs in crimson silk (faithful reproductions from the antique) are there.

As to the lighting there is also a handsome ventilating-lamp with switch-on device, by Sugg. By the way, it is rather interesting to observe that throughout the exhibition, the fact that gas can be made to automatically contribute to air sanitation as well as give light is freely demonstrated. The heating is by a "Blenheim" fire in a dog grate by William Edgar; and, for the convenience of smokers, a Tilley cigar-lighter is handily placed.

The dining-room is another exquisite place. We cannot help feeling the farther we proceed that all concerned in building up the exhibition have done their work remarkably well. An Adam pedestal sideboard, with a handsome pair of lead vases upon it, attracts notice. There is also a beautifully carved Chippendale side table; and an Old English Spanish mahogany dining-table in three parts, such as is seldom made now. Messrs. Mawers complete the choice furnishing with some magnificent Chippendale chairs.

The lighting of the room is by choice candle brackets and a pendant by Ingram and Kemp, in antique brass bronze, with green shades. The room is fitted by two fires, so as to show the visitor alternative ways of doing the heating. There is a "Blenheim" fire in dog grate fitted by Edgar, and a 21-inch "Swastika" gas-fire, finished in armour bright, by Wright's. These are both nice pieces of work. A Tilley cigar-lighter is in evidence.

In the remote corners of both dining and drawing rooms are hot-water radiators (contributed by Thomas Potterton), illustrating how these can be used for supplementing the ordinary gas fire where rooms are spacious. New pattern quick-turn regulating-valves are provided—these being an improvement on the screw-valves commonly used. The goods are of the "Ideal" well-known pattern, and are manufactured by the National Radiator Company.

But let us return to where we commenced this exploration, and take the side rooms attached to this splendidly equipped town house, which demonstrates that for artistic merit, quality of light, and heating gas gives precedence to no competitor. Standing at the beginning of the rooms on the right-hand side, we have in order the boudoir and staircase, bathroom, bedroom, dressing-room, bedroom, day nursery and nurse's scullery, a night nursery, children's bathroom, and housemaid's scullery.

The ladies will be charmed with the boudoir. The artistic effect is excellent. While we do not propose to notice specifically the furnishing of all the rooms (which is all in most tasteful style), attention will not fail to be arrested by a reproduction piece in the shape of a beautifully decorated cabinet of the Hepplewhite period, with chairs *en suite*. The New Inverted Company are responsible for the lighting of the boudoir; the fittings being two two-light oxydized silver brackets, fitted with Rose du Barry silk shades. They have also here a standard lamp, in brass, with Rose du Barry shade. The heating is by a 17-inch "Gnome" fire, in armour bright, by Arden Hill.

The adjoining staircase is illuminated by a polished brass standard (with old gold silk shade) on the newel, by the New Inverted Company; and the heating is by a Davis gilled circulating radiator located on the half-landing, as well as by a Hands "Vitreosil" radiator.

The bathroom is properly equipped with bath, &c., in the manner that a high-class bathroom should be. There is plenty of provision for light and heat here. Three brackets and burners have been supplied by the New Inverted Company, a 10-inch "Colmore" fire by Parkinson, two geysers of different sizes and a towel-rail by Ewarts, and a curling-iron stove by Richmond.

Regarding the first bedroom, the feature of its furnishing is a beautifully made sycamore suite of the Adam style, with gilt mouldings. The lighting is by a pendant and four oxydized silver brackets, with "Nico" burners and mauve shades. There are two fires—the "Neptune" (with side boiling burner) by Davis and the other by the Welsbach Company (an enamelled steel blue Welsbach-Kern radiator). A curling-iron stove has been supplied by Richmond.

Passing into the dressing-room, the furniture is of the expected type. As to the gas arrangements, there are three antique silver finished brackets and intermediate burners (fitted with old gold Empire shades), by the Bland Light Syndicate, a gas-fire of the Parkinson make, one, the "Lilac," of the Cannon make, a large and small geyser, together with a towel-rail, by Ewart, and a curling-iron stove by Richmond.

The second bedroom is also a pretty apartment. Its illumination is by three one-light brackets and a pendant by Bland. Two of the brackets are of the two-light candle pattern, Flemish design, and finished in antique brass. The burners are of the intermediate type, with white chintz Empire shades. The other bracket is of Flemish design, with Bland burners and old gold "Empire" shades. The pendant is of Flemish design in antique brass, with Bland "Universal" burner," and white chintz shade. The same firm have supplied a Dutch china reading-lamp, with chêne silk shade. A Main fire, with Larkin boiler, is fitted; and the gas equipment is completed by a Fletcher domestic iron, and a curling-iron stove by Richmond.

The day nursery—fitted up as nurseries should be—is lighted by two one-light brackets with old gold shades by Bland; and a semi-indirect fitting, with opal ornamental bowl, by Sugg. The heating is by a 14-inch "Vulcan" fire.

Not many nurses are favoured with such a scullery as we see here—comfort and convenience abounds. The illumination of the place is by Bray one-light brackets; and the heating is by a Richmond "Georgian" fire. The lady who reigns here is also given the convenience of a small table cooker by Sugg, a curling-iron heater, and a domestic iron.

In the night nursery, there are two brackets over the bed, and a three-light pendant on the indirect lighting system, both being supplied by J. & W. B. Smith. The heating is by a Wilson fire.

In the children's bath-room, the fittings of which will be examined with much interest, there are found two inverted burners by

Bray, a "Ratcliff" gas-fire by Parkinson, and a multi-geyser by the same firm.

We will pass over the details of the various offices, and at once pass to the left-hand side of the centrally placed apartments. There are in order the billiard room, library, pantry and kitchen, scullery, larder and laundry, and garage. This is seen to be a practically laid out, as well as luxurious, town house or flat.

Suffice it to say about the billiard room that it is fitted by Messrs. Burroughs and Watts. When this is said, nothing more need be added to assure of completeness. The same firm are responsible for the scheme of lighting over the table. On the walls are four Bland "Georgian" candle bracket lamps, finished in antique brass. One of the new "Adam" fires, with back and hood, by Richmond is fixed here; and there is also one of Wright's copper bronze "Swastika" fires.

In the reposeful library is seen furniture of the Queen Anne period. The lighting is by two brackets and inverted pendants by Sugg, with a table lamp in the centre, fitted with a dark red shade. The fire, in a Bratt Colbran grate, has been supplied by Fletcher; and naturally a Tilley cigar-lighter is provided.

In the pantry, which like all the other rooms is suitably fitted, there are a bracket and a pendant light by Sugg, one of Clark's (Richmond's) syphon "Simplex" condensers, and a "Bungalow" cooker, with Larkin's "Surprise" boiler, by Richmond. This cooker is fitted on a stand adjustable in height from 7 to 11 inches. The water is heated in the Larkin boiler by the heat generated from the oven during the process of cooking. The same firm has supplied an Elbard patent toaster.

In the kitchen of a magnificent house of this kind, one expects to find an elaborate gas equipment. This kitchen is furnished as it should be. In regard to the lighting there are three brackets, by Sugg; and for the first time we meet with a bracket fitted with a flat-flame burner. This flat-flame burner seems like something peeping from the distant past at this lavish display of the gas industry's modernity. But still a flat-flame burner may have some use in a kitchen. Ingram and Kemp have also supplied an inverted burner pendant. But the hot water, cooking, and other appliances are the real gas features of the kitchen. There are two "Blenheim" gas heated hot-water circulators—shown by Edgar on the one part and by Wilson on the other. A coke boiler of the Tilley make is fitted up. There is also a plate-warmer, a singeing burner by Fletcher, a boiling-ring by the Cannon Foundries, a "Bordo" double cooker by Wright, a roaster and a double "Regency," by Sugg, a carving-table by Wilson, a hot-plate, 36 inches wide by 35 inches high on cast stand, by Fletcher, a Dr. Forbes sterilizer by Lumley and Co., a *bain marie* and a coffee-roaster by Davis, a steamer by Richmond, a stock-pot by Parkinson, and a tea-boiler by Ewart. This is a kitchen of luxurious appointments; and to such kitchens the gas industry is extremely partial. A sample of Bale and Church's "Kleenoff" preparation for the cleaning of gas-cooking apparatus is noticed here, as in the other kitchens.

But we have not done with the gas equipment in this part of the house. The scullery has an independence of its own in the matter of gas equipment. There are brass bracket lights and a steel bronze pendant by Ingram and Kemp, a "Sun" boiler by Wright, a dust-destructor by Davis, a single small cooker by Arden Hill, a wash-boiler by the Cannon Foundries, a grill by Sugg, and a steamer by Richmond.

The larder is fitted with bracket and pendant lights, and the laundry by a two-light pendant and a two-light bracket by Ingram and Kemp. There are in the latter place gas appliances by Tilley for laundry work, including a linen-airer by Davis.

The garage will interest the motorists who visit the exhibition. We do not know whether a motor-car will eventually be found here; but, at the moment of writing, there is some trouble about it, though available motor-cars for the purpose are not scarce. The lighting is of a double character. There is in the ceiling a Sugg special suspension lamp; while two back lamps, by the same maker, have also been fitted outside, and reflect into the garage. Two special hot water radiators have been supplied by Ewarts; and Davis have furnished a six-column 38-inch safety radiator likewise special to such work as this.

The town house, it will be seen, is liberally supplied with all that, and perhaps rather more than, is necessary for such a place for gas lighting, heating, cooking, and the provision of hot water. But it demonstrates the clean, convenient, and economical service to the householder of gas in a properly equipped house. We should have liked to have said more in this article regarding the artistic appearance of the fittings and of shades and glassware. But the necessity of writing this article before all that is now to be seen was in complete form deprived us of inspecting the final touches; and moreover the claims upon our columns to-day are of an extensive character.

The Bandstand.

Leaving the town house, there is an open space, central in which is a bandstand, where at intervals every day during the course of the exhibition some of the best of our military bands will be performing. On the four sides are rows of chairs; and we have no fear that actual event will provide the negation of the statement that many visitors will rest here from their investigation of all that goes to comprise this original and wonderful exhibition. There is so much to see; so much that is novel in this line; and it is all so different from all else that has preceded it, with the object of interesting and educating the public in modern gas applications. The general lighting hereabouts has already been noticed; in addition to it, in the centre of the band-stand, is a Milne cluster light.

A Model Tenement.

Looking to the right-hand side of the band-stand, there will be seen a model tenement. This comprises a bedroom, scullery, living room, and hall; tastefully decorated and furnished. The fittings in which we are specially interested comprise: In the bedroom a bracket and inverted burner by Kempton, and a 10-inch Imperial "Quebec" fire. In the scullery are seen a bracket light, a wash-boiler, a Davis geyser, and a Fletcher domestic iron. The living room is illuminated by two single light Kempton brackets. A Vulcan cooker with Larkin boiler is also on view. There is likewise a coal grate with an inset gas-fire, by Welsbach. A Richmond domestic steamer and a toaster are noted, as well as a single Cannon boiling ring.

A Well-Appointed Studio.

On the opposite side of the hall, there is a studio; and, from our knowledge of the ordinary studio where there is a great deal of makeshift and incompleteness in equipment, we venture to think this particular studio would delight the hearts of some of those who pass their days in such places. As to the illumination, there are inverted lamps by Sugg and Falk, Stadelmann, and Co., as well as two useful standard lamps, with six sunken points, covered with floor-plates, for shifting the lamps about. The heating is by two gas-fires—a Fletcher and a Welsbach-Kern radiator, enamelled in golden green. The hypothetical occupant of this studio is apparently a bachelor; for he has fixed one of Main's cookers here, with a bracket over it. He has also a Fletcher geyser at command; and to complete his luxurious surroundings, a Tilley cigar-lighter.

Smaller Town (or Middle-Class) House.

Here we have, down the centre and on each side of the hall, another type of house illustrated. It is called a smaller town, or middle-class, house. The rooms are tastefully furnished; and again the visitor is shown how charmingly and usefully gas enters into our homes. The centre apartments comprise drawing-room, dining-room, kitchen, and pantry. On the right-hand side, we have bath-room and dressing-room, and bedroom; while on the left-hand side are a workroom, day nursery, nurse's scullery, and night nursery, and a children's bath-room.

Paying a hasty visit first to the drawing-room, comfort and elegance abound—the elegance of a character suitable to the less pretentious town house. Here are found charming china cabinets, comfortable upholstered furniture, and the whole very restful and inviting to the weary man or woman. The lighting of the room is all by Bray and Co., and the effect is excellent. There are four two-light candle brackets, a polished brass standard lamp, and a table lamp—all fitted with Rose du Barry shades. The heating is by a 14-inch built-in "Herald" gas-fire, finished in armour-bright, by Wright; and there is a boiling-ring, finished in white "Porcellanite" enamel, by Richmond. A "Taxi-meter" by the Rotary Meter Company is shown here.

In the dining-room, the furnishing is of the very essence of refinement; the dining-table, chairs, and bureau being compatible with the general scheme. The lighting is by four brackets and a pendant by the New Inverted Company; and the heating by an armour-bright finish "Hercules" gas-fire by Davis. A cigar-lighter by Tilley is provided. A discount meter with attachment is shown.

Adjoining the dining-room are the kitchen and pantry; and again there is found a good range of gas-consuming appliances, such as delights the hearts of those in charge of gas undertakings. The lighting is by three brackets and a pendant by the New Inverted Company, all, of course, fitted with the "Nico" burner. In connection with the culinary operations, there is observed a special range combining hot closet, fire, cooker, and circulator, by Arden Hill, a singeing burner on the chimney breast by Fletcher, one of Dr. Forbes's sterilizers by Lumley and Co., an Imperial boiling-ring, a griller on a stand by Wright, a domestic steamer and a toaster by Richmond, and a coffee-roaster by Parkinson. A coke-boiler by the Phœnix Supply Company completes the equipment.

On the right-hand side of the hall, we have (still continuing the notice of the rooms comprising the smaller town house) first a bedroom. This is prettily furnished in mahogany; and here we have twin beds with cane panels. There are two antique copper brackets, with Bland burners, fitted over the bed, and a pendant over the dressing-table, all with pretty shades. The heating is by a 10-inch "Rose" gas-fire supplied by Cannon Foundries; and on one side of the fire is a Richmond curling-tongs heater.

The next bedroom is furnished with a nice bedstead, with suite to match, decorated with neat cane panels. This is likewise lighted by Bland fittings and burners, with suitable shades; while the heating is by a Fletcher 12-inch gas-fire, with a Richmond curling-tongs heater also in evidence.

Turning into the dressing-room two Bland brackets and burners are seen there, with cast back panels, finished in antique silver. There are also a 10-inch Cannon fire, a Richmond "Louis" fire, and a small Ewart geyser. The bath-room is fitted up as a bath-room should be; and again Bland burners are in use. The hot water is obtained by an Ewart geyser, and warmth in cold weather by a Fletcher condensing-stove.

Taking the rooms on the left-hand side of the hall which finish the small town house, there is first the workroom. In this the

lighting is by Falk, Stadelmann, and Co.; the fittings consisting of two two-bracket lights and a three-light pendant, all in oxydized silver. The room is heated by a 10-inch fire, with Larkin boiler supplied by Davis; and, to facilitate work, the equipment includes two Fletcher irons. A discount meter with attachment is shown here.

In the day nursery, there are four bracket lights, and one semi-indirect pendant by Kempton. Here and elsewhere, we have it demonstrated that there is a growing feeling that the correct thing is to protect the eyes of children from the direct rays of open lights—and, as we know, more so in the case of electric lights than in that of gas-lights. In the same room, there is a 10-inch "Pansy" Cannon fire.

The nurse's scullery is well equipped with gas conveniences. There are for lighting it, two inverted burners by Kempton, a condenser, a Richmond "Ironclad" circulator, an Imperial "Premier" cooker, a Parkinson towel rail, a domestic iron, and an Imperial fire.

In the night nursery, there is a bracket over the crib, two brackets adorn the mantel, and a pendant is also in evidence; while heating is demonstrated by a Welsbach fire, and by an Imperial "Quinoa" fire. A "Taxi-meter" is shown here.

A children's bath-room follows, in which, among other fittings, is a Welsbach-Kern radiator enamelled white, a Hands radiator, and a lavatory geyser by Parkinson. The bath and fittings are by the Cannon Company; and the lighting is by Kempton.

Newspaper Room.

A peep is next taken into the newspaper reading-room, more to see whether due consideration has been given to proper lighting for the reader than to ascertain how the place is fitted up in other respects. It is observed that there are six bracket lights on each side of the room and four standard lamps (all in oxydized copper) over the reading-tables—Falk, Stadelmann, and Co. being the contributors of these fittings.

Twenty Pounds a Year House or Flat.

We pass to the suite of rooms that come under this heading. The gas industry has a large custom from the occupiers of the small class of property; and it is hoped that a good many people only possessing small incomes will visit the exhibition to see the useful gas appliances that come within their means. The rooms of this £20 a year house are furnished by Mawers, Limited, in a manner eminently suitable for the requirements of the occupants of habitations of the kind. There is a sitting-room, a kitchen and scullery, a bedroom, and a properly fitted bath-room. This is luxury indeed for a workman's flat; though it should all be regarded as necessary to a healthful existence.

Let us stay for a minute or two to say that Messrs. Willey and Co., Limited, have been entrusted with the none too simple task of demonstrating how this working man's house, at a rental of £20 a year, can be pleasingly and effectively fitted with the necessary lights at a figure commensurate with the average occupier's means. Obviously taste and discrimination must be the keynote to observe in this as in fitting up a ducal mansion; and although the same elaboration of detail and wealth of ornamentation would be beside the mark in the former, nevertheless the more humble householder's sense of perception to things of beauty and utility might be just as keen, and his demands just as exacting. Consequently an equal amount of care and study needs to be exercised, in order to obtain the best results both in appearance and effectiveness. In the two sitting-rooms of the house, the interested visitor will be enabled to judge which of two systems of lighting he would prefer. In the one is a typical example of centre lighting effected by means of a polished "Surprise" pendant with red silk shade, which distributes a soft, diffused, and very pleasing light. The pendant can be raised or lowered at will; thus being adaptable for illuminating a wide area, or for a more concentrated light suitable for reading or writing. The second sitting-room is fitted with a pair of ornamental brackets with satin-finish globes—fitted on each side of the fireplace. Proceeding to the bedrooms, two examples of lighting are again found—one being effected through a "Universal" inverted pendant finished in oxydized silver, and fitted with a yellow silk shade. This fitting, it might be added, is also adaptable at very short notice for two positions—no less than a foot of difference in height being attained. In the second bedroom, the visitor finds another example of elegance and neatness combined with effectiveness in economic lighting. This consists of a fancy fluted bracket, with striking oxydized silver finish, and supplied with an amber shade; and, to those whose fancy predisposes them to side lighting as opposed to central distribution, this should specially appeal.

The kitchen—where beauty might with advantage be sacrificed to utility—is fitted with a centre suspension harp pendant, which is at once adaptable for either upright or inverted burners. This is finished in steel bronze, and fitted with a satin-finish globe. The bathroom contains a simple, yet elegant, bracket, finished in steel bronze, with a satin-finish globe. The scullery is not by any means neglected; adequate light being provided for in a plain inverted bracket fitted with a globe. The burners attached to the fittings are of the "Commercial" type (Tooth's patent); these being exclusively manufactured by Messrs. Willey.

Regarding heating, a Davis "Minerva" fire, with Larkin boiler, heats the bedroom. In the principal sitting-room, a Parkinson "Pathan" fire provides the heat. The kitchen is fitted with a Wilson single coooker; and an "Alpha" wash-boiler, by Arden Hill, is also in evidence. The Davis Company have supplied a suitable gas-heated toaster, a pyramid iron-heater, a boiling-ring, and other appliances. The Richmond Company have also a steamer and a toaster here. The bathroom is heated by a condensing-stove—the hot water being provided by a Parkinson "New Treasure" geyser. A Phœnix coke-boiler is in evidence.

Gas-Fires, Etc.

In the open space adjoining is found a range of gas-fires representing the productions of the makers, more advertising signs, and moving photographs. Among the exhibits are four figure lamps by Smith; and a revolving Ramsey advertisement sign. The fires are the makes of Arden Hill, Cannon, Davis, Fletcher, Imperial, Main, Parkinson, Richmond, Tilley, Vulcan, Wright, and Welsbach.

Rest-Rooms.

Here, as in the connecting-link between most of the galleries, a rest-room has been established, where comfortable arm-chairs and pretty surroundings invite one to rest from peregrination of this vast creation of the collective endeavour of the gas industry. There is so much to be seen; and interest will not allow anyone to abandon the further exploration of this extensive portrayal of the industry's capacity for efficient service in all walks of life where light, heat, or power are required. The annexe is fitted with four Edgar low-pressure lamps and various radiators by Cannon Foundries, the Imperial Company, Richmond, and Wright.

ENGINEERING AND MISCELLANEOUS HALL.

(Gallery No. 4.)

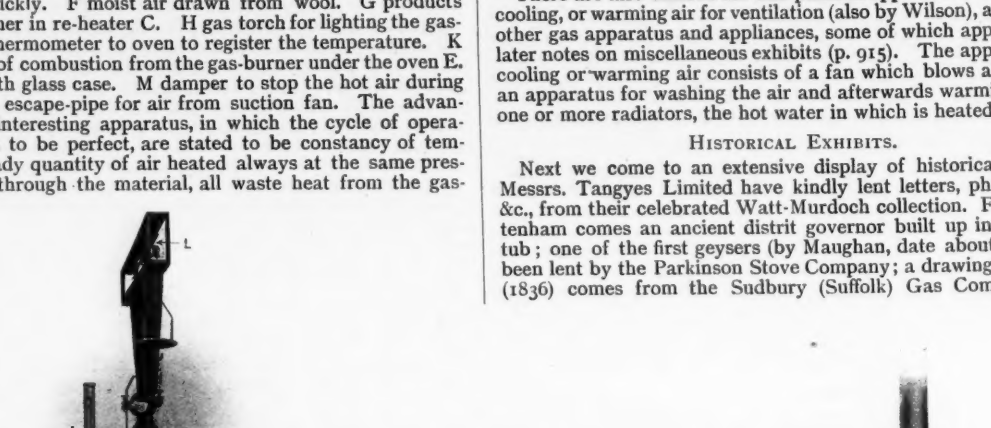
General Lighting and a Gas-Fire Stand.

Having rested, one finds his attention completely diverted from domestic life to matters identified with engineering and scientific work and the application of gas in various public institutions. These exhibits show how the application should be made, and not how some gas suppliers are content to let such applications discreditably stand until one or other competitor pushes gas out. This is one open hall, without corridors or overhangings of any kind. The general scheme of lighting is by two rows of various makes of lamps; and through the whole of the scheme here, the lamps have been fitted with pilot lights and control valves. A bye-pass cup, with ball-and-socket and mercury seal, are being used; the object being to prevent the pipes being charged with air. In all 36 lamps are being used for the general lighting—supplied by Helm, Hands, Kempton, Bland, Smith, Sugg, and Welsbach—exclusive of the emergency lighting. The first thing that greets one is a long stand built with mantels, and arranged, in zig-zag form, in which are placed representative types of fires supplied by various makers. There are seen in the mantels or on the stand a Wilson fire, a Cannon 13-inch "Rose" fire, a Parkinson 12-inch "Edmund" fire, an Imperial 12-inch "Brekker" fire, a "Flambeau" and a "Renaissance" fire by Richmond, an "Original" fire and a "St. Nicholas" fire by Main, a "Kalo" and an "Olak" fire by Arden Hill, a "Baskerville" fire by Wright, a "Hero" fire by Fletcher, and a "Vulcan" fire. Gas-fires for grates are shown by Fletcher, Main, Edgar, and Tilley. There are radiators by Richmond, Main, Hands, Arden Hill, Fletcher, and Davis. Among miscellaneous goods, there are a Parkinson griller on stand, a single and a large cooker. An Imperial boiling-ring is shown, and one each by Main, Sugg, Wright, and Parkinson. A "Clyde" griller and a "Bungalow" cooker by Richmond. Also a double-boiling hot-plate by Wright. Grillers by Sugg, Wilson, Richmond, and Parkinson. There are four floor lamps exhibited here by Falk, Stadelmann, and Co.; and several brackets by the New Inverted Company are in use. There are also brackets and burners fitted with the Pneumatic Lighting Company's and Telephos lighting and extinguishing devices. A Ramsey pedestal sign is also here.

A Conditioning Oven and Heater.

Attention is arrested by the next stand occupying a space some 20 ft. by 6 ft. Thereon is shown something that is new. It is the Wilson conditioning oven and heater (by Wilsons and Mathiesons) for ascertaining the percentage of moisture contained in yarns, wools, noils, tops, cotton, and other textile material. One of these ovens and heaters has been installed in the City of Bradford conditioning house, with remarkable results in the matters of efficiency and economy. The arrangement is difficult to describe without an illustration, and so we give one on p. 908, in order to facilitate the understanding of the working and operations. By means of a fan A, fresh air is blown through the heaters C D into an oven E. Then a suction fan B draws the air out of the oven with the moisture, &c., from the cloth yarn or wool along the pipe F into the heater C. The re-heater C uses up (1) the waste heat from the oven E, which is drawn along the pipe F, and (2) the hot products from the gas-heated heater D along the pipe G. These are drawn through twenty-four pipes divided into four sections; the air passing twice up and twice down, and so the travel is increased, and all the heat practically absorbed and transmitted to the fresh air blown round and between the pipes, but in no way contaminated, as the waste heat is inside the pipe and the pure air outside. The heating chamber D contains twelve wrought-iron pipes in four rows. Each pipe has a gas-flame burning inside and heating it; the products being drawn away by the

pipe G into the re-heater C, as previously stated. The pure air, which has been already partly heated by the heater C, is now heated to the required temperature for use in the oven E. In the oven three cans holding the wool, &c., to be conditioned are placed. The special balance in glass case and weight fixed on the top is used to weigh the cans from time to time during the conditioning. An atmospheric gas-burner is fixed under the oven to assist in heating up quickly. F moist air drawn from wool. G products from gas-burner in re-heater C. H gas torch for lighting the gas-burners. I thermometer to oven to register the temperature. K the products of combustion from the gas-burner under the oven E. L balance with glass case. M damper to stop the hot air during weighing. N escape-pipe for air from suction fan. The advantages of this interesting apparatus, in which the cycle of operations appears to be perfect, are stated to be constancy of temperature, steady quantity of air heated always at the same pressure passing through the material, all waste heat from the gas-ovens re-used without coming into contact with the material, the atmosphere of the rooms is greatly improved, there is a great saving in working cost for gas alone, there is increased output, and there is no scorching of the material or fabric. This is a comprehensive list of beneficial results.



THE WILSON CONDITIONING OVENS AND HEATERS—FOR ASCERTAINING THE CORRECT PERCENTAGE OF MOISTURE IN YARNS, WOOLS, AND OTHER TEXTILE MATERIALS.

Sundry Exhibits.

There are also entered for this position apparatus for cleansing, cooling, or warming air for ventilation (also by Wilson), and sundry other gas apparatus and appliances, some of which appear in our later notes on miscellaneous exhibits (p. 915). The apparatus for cooling or warming air consists of a fan which blows air through an apparatus for washing the air and afterwards warming it over one or more radiators, the hot water in which is heated by gas.

Historical Exhibits.

Next we come to an extensive display of historical exhibits. Messrs. Tangyes Limited have kindly lent letters, photographs, &c., from their celebrated Watt-Murdoch collection. From Cheltenham comes an ancient distrit governor built up in a wooden tub; one of the first geysers (by Maughan, date about 1868) has been lent by the Parkinson Stove Company; a drawing by Malam (1836) comes from the Sudbury (Suffolk) Gas Company; by printed contributions from the Gaslight and Coke Company and the Reading Gas Company, we are carried back to early gas times (notice Winsor's seal and medal); ancient gas-burners are lent by Sugg and Bray; the Newcastle-on-Tyne Gas Company and the Stockport Gas Department make interesting contributions; and so do the Herne Bay Company. The Wellingborough Gas Company have made contributions taking us back to the days of 15s. gas. They have also lent a gas cooking-stove, by Sharp, dating back to about 1850.

Photometer Room, Public Gas-Testing Station, and Laboratory.

In one building partitioned off into a photometer room, public gas-testing station, and laboratory there is found a great deal of interest. The work of fitting this building up was confided to Messrs. Alexander Wright and Co.; and the two co-workers Mr. J. F. Simmance and Mr. Jacques Abady have thrown themselves into the project with considerable enthusiasm. It is an exhibit that is not to be treated in any cursory manner, for it is perhaps the most scientific and educational exhibit in the vast show for the technical man. This being so, a special illustrated article is devoted to the exhibits on pp. 919-22. The demonstration shows how a gas-works laboratory should be fitted up, also the equipment for a public gas testing station, and exhibited for the first time is a system devised by Messrs. Simmance and Abady for readily taking the hemispherical candle values of high-power lamps. It is a pity that there is not a high-pressure gas supply to the stand, as then some interesting data might have been obtained from high-pressure lamps. As it is, we have no doubt Messrs. Simmance and Abady would be able to test here the efficiency of high candle-power low-pressure lamps if manufacturers care to see the system brought to bear on their wares. For the lighting of the stand, five Kempton lamps have been fixed; and for testing purposes twenty points have been provided. Benches have been fitted, and water laid on to sinks, &c., for demonstration purposes.

Further Laboratory Apparatus.

After inspecting some photographs illustrating installations of gas appliances in hotels, institutions, and other buildings, we find a display of apparatus for the chemical analysis of gas by Messrs. Townson and Mercer. This exhibit is under the charge of an expert chemist.

The firm are exhibiting a complete set of apparatus for the analysis of gas after it leaves the retort. In addition, there is apparatus used in the laboratory, such as gas distributors, water-taps, explosion pipettes, &c., which will appeal to gas chemists. The firm's apparatus include the Evans nitrogen test, Somerville's apparatus, Somerville's meter, Dickenson-Gair's new gas analysis apparatus, Hornby's apparatus, Orsat's apparatus, Dickenson-Gair's calcimeter, Mann's apparatus, and Norton refractories.

Dentists' Appliances.

Next we come across some dentistry appliances—all gas heated, and principally used in the manufacture of artificial teeth.

Exhibitors' Consultation Rooms.

Nothing seems to have been neglected for convenience. Returning to the beginning of the gallery, on the right-hand side there are half-a-dozen consultation rooms for exhibitors; and each is lighted by a pendant supplied by one or other of the lamp makers.

Effect of Light on Wall Paper.

Here we have six bays for demonstrating the effects of different coloured wall papers upon illumination. The bays are papered; and single light pendants are fitted in the centre; these having been supplied by the New Inverted Company, Podmore and Co., Sugg and Co., the Welsbach Company, and Willey and Co.

Institution Bath Appliances.

The next exhibit shows special bath arrangements for institutions. The principal part in this exhibit is taken by Ewart and Sons. Among other things is seen their multi-geyser. The lighting is provided by Hands.

Hospital Ward, Sanitary Appliances, &c.

A section of a hospital ward next comes under observation, and following are hospital sanitary appliances, a hospital bath-room

(demonstrating hot-water appliances for hospitals, and a nurses' sitting-room.

The ward is furnished in orthodox manner. The lighting is divided between Falk, Stadelmann and Co., and Sugg and Co. The last-named firm have supplied a ventilating-light and a semi-indirect pendant-light; and Falk, Stadelmann, and Co., a single light over the bed, and two brackets with inverted burners at the side of the bed. A Wilson gas-fire is used for heating, with a four-loop hot water radiator by Davis. A Forbes sterilizer by Lumley and Co. is also seen; and to complete the equipment is a Sugg "Petworth" cooker, with Larkin boiler. The furniture is by Hospitals and General Contracts Company, Limited.

The hospital sanitary appliances have been supplied by Messrs. Davis and Bennett of Westminster; and the beautiful goods in white porcelain will, we are sure, be much admired.

The operating theatre will also attract much attention. A good light is wanted in such places; and a three-light oxydized copper inverted pendant by Milne supplies it here. The pendant is fitted with a Milton burner and "Viaduct" mantles and glass. Hands is also concerned in the lighting. The heating is by a Wilson 16-inch fire, and two hot-water radiators by Richmond. Sugg and Co. supply a sterilizing apparatus.

There is next the bath-room, which, as stated previously, shows a sample of the splendid work of Messrs. Davis and Bennett. The bath-room is lighted by two polished brass brackets fitted with Bray burners. A 14-inch Vulcan fire heats the place. A Sugg geyser is also fixed.

Part of the bay is divided off to form a lobby, illuminated by two single-light brackets by Bray. Here is an Imperial destructor, and a fumigator by Davis; but principal interest is found in a working exhibit of automatic hot water supply, with three Potterton "Victor" boilers arranged upon the battery system in conjunction with a cylinder of 100 gallons capacity. The boilers being situated below the storage are fitted with high returns forming "cold-top" sections (or "C" pattern connections); thus reducing the heat loss by radiation and maintaining low flue temperatures. Thermostats are fitted to each boiler, two of which have bunsen burners, and the third luminous ones, either of which can be supplied according to preference. The installation is fully equipped with primary and secondary circulators; the former being arranged with cut-out valves to operate the storage in three sections—thus heating one-third, two-thirds, or the whole of the contents of the cylinder proportionate to the varying requirements and proportionately to the capacity of either one, two, or three boilers, which can be used accordingly. This system, as in all "Victor" installations, by the arrangement of the circulating-pipes will deliver hot water at high temperature as it is produced; and by this means in ten to fifteen minutes water at 140° Fahr. is obtainable. The full running capacity of the plant is 80 to 100 gallons of water at 140° Fahr. per hour, according to the initial temperature of cold water. The secondary circulation, provided to reach near the points of supply, is fitted with the night valve to prevent the loss of heat through the flow-and-return; thus conserving the heat left over from day-to-day, which, to a considerable extent, would be wasted with a run of secondary flow and return continuously in action. A further advantage can be obtained by adopting a jacketed cylinder, when the heat is held without any appreciable drop in temperature during the night. Thus the hot water unused is available from day to day, which for early morning supply is a standing feature of a Potterton installation.

A nurses' sitting-room succeeds. It is furnished as such a room should be. The lighting is by Bray—two one-light inverted fittings being provided, with a pendant, all in oxydized copper. The "Georgian" fire is by the Richmond Company; and the "Petworth" cooker by Sugg; while a curling-iron stove is by Richmond. A Sugg sterilizer is also among the equipment.

School Class-Room Lighting.

A school class-room is fitted up to show how such a place should be illuminated and heated. There are special pendants by Sugg and Co.—mostly semi-indirect lighting; and for lighting the blackboard, a "Regency" lamp is fitted with a parabolic reflector. The heating is by means of a "Louis" fire by Richmond, and a 17-inch "Gnome" fire made by Arden Hill. There are also three hot-water radiators; and these provide a working exhibit of low-pressure hot-water heating. The three radiators have together 120 feet of total heating surface; and they are supplied from a "Victor" boiler filled at the same level, with circulations arranged upon Potterton's "high return" system. A very special feature occurs in this installation, as, owing to the presence of doorways, the ordinary gravity system of circulation was not suitable—a condition that commonly occurs in flats. The mains (both flows and returns) serving two radiators on the sides of doorways remote from the boiler are carried overhead (above the ceiling-line), falling and rising on the wall to the radiators in each case. The third radiator, being adjacent to the boiler without door openings intervening, is connected direct with the low return; thus demonstrating the possibility of combining the regular and irregular construction where this may be necessary. The boiler (a No. 20 "Victor") standing on the same level is fitted with "A" pattern connections (low return), and specially tapped and bossed for triplicate circuits, thus demonstrating the flexibility of the design. The system is devoid of control valves, as the pipe sizes are proportionate to the respective heating surfaces, although in cases where the heat might require to be cut off, stop-valves would be applied.

Church Lighting and Heating.

Another interesting structure demonstrates, on a small scale, church lighting and heating. Quite an ecclesiastical appearance is given by the architects to this exhibit; and real church furniture has been installed. The heating is by Wright's radiators. The illumination is provided by band lights, corona lights, and concealed lighting, with the Pneumatic Lighting Company's and the Telephos systems of ignition and extinguishing in use.

Drawings, Photographs, &c.

Here and on the opposite side are plans, photographs, drawings and models, illustrating the manufacture and distribution of gas. For the illumination of these two-light pendants are employed. The drawings, &c., of several firms are specially noticed at the close of this general description.

Administration Offices.

Returning to the beginning of the left-hand side of this hall, there are here the general administration offices, and the Organizing Manager's offices.

Business Office and Draughtsman's Room.

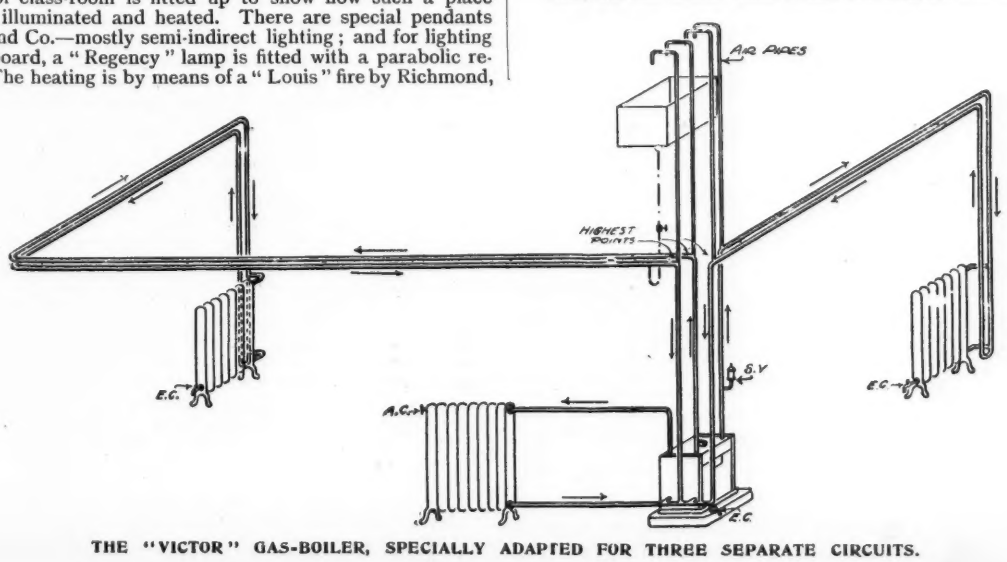
Here is shown how a business office and draughtsman's room should both be lighted and heated. The lighting is by Sugg and Willey. Two of the Sugg ventilating-lamps are noticed; and the Willey contribution consists of three one-light inverted gas-brackets and two pendants, with a table lamp. Two radiators are employed in the heating—one by Main and the other by Fletcher; while the Imperial Company have supplied a 12-inch "Quorn" fire. A coin-counter is exhibited by Thomas Glover and Co. The furniture is by the Library Bureau.

Caterers' Kitchen.

Here we have an exhibit, lighted by Hands' inverted lamps, comprising a large collection of cooking appliances, which will bear the most critical inspection by those engaged in the art of catering for the internal wants of the public. There is a treble cooker and a griller by Sugg, a roaster and a boiler by Arden Hill, a steamer and a soup boiler by Wilsons and Mathiesons, a carving-table, with overhead gear, by Fletcher, a stock-pot by Wright, a milk urn, and fish-fryer, and an oven by Main, a coffee-roaster by Davis, a tea-boiler by Still, a boiling hot-plate by the Cannon Foundries, a pastry hot-plate by Parkinson, and a hot-plate by the Imperial Company. A copper "Therma" by Sugg is also seen. The Anglo-French Fireproof Company's cooking utensils are used.

School Cookery Centre.

This, like the model class room, will interest our educationist



THE "VICTOR" GAS-BOILER, SPECIALLY ADAPTED FOR THREE SEPARATE CIRCUITS.

visitors, as it shows the types of equipment that are required for this important branch of educational work among our girls. The room is illuminated by two three-light Sugg ventilating-lamps (with switch-on devices), and three Bray inverted brackets. The hot water and cooking equipment consists of a combination coal and gas range by Main, a special cooker by Wright, a large single cooker by Davis, a single "Imperial" cooker, a wash-boiler by Wilson, a multi-geyser by Sugg, and a service geyser by Edgar.

Hotel Kitchen.

Hotel and restaurant proprietors, the managements of clubs and of other places where people are in the habit of satisfying the requirements of the inner man will find a great deal that concerns them in the model hotel kitchen. The kitchen is lighted by six 300-candle power low-pressure lamps, with reflectors, by the New Inverted Company. Important is the cooking equipment. In this are found a griller, toaster, and hot closet by Wright; a fine quadruple range and a *bain marie* by Richmond; a "Langham" range (in which the gas-jets are outside the ovens) and a stock-pot, by Fletcher; a special roaster by Davis; a carving-table, with nickel facings, by the Cannon Foundries; a "Westminster" cooking-stove, a pastry-oven (as supplied to Windsor Castle and Buckingham Palace), and a sterilizing apparatus, by Sugg; a confectioners' oven by Arden Hill, a stock-pot by Parkinson, and a tea-boiler by Still. It is a fine collection; and the work of the manufacturers generally is seen to be of such a character that it would be very difficult to award any of them pre-eminence in this regard. Competition is too keen among them nowadays for any slovenly work; and reputation for good work is at the very base of sustained patronage.

TEA ROOM, LECTURE HALL, COOKERY DEMONSTRATION ROOM, RESTAURANT, Etc.

(Gallery No. 5.)

Passing through the annexe, lighted by four Helm suspension lamps, and heated by radiators, we reach a gallery where will be a considerable amount of life during the exhibition, for here one can refresh oneself, here too there will be the conferences and lectures, cooking demonstrations and competitions, and the banquetting-hall will be the scene of much congratulation, good wishes, and rejoicing.

Café and Tea Room.

In order, we take first the tea room. This is a place with a floor area 45 ft. by 90 ft. Along the front and one side is a simple barrier; and the service room is at one end. The open space of the tea rooms is lighted by fifteen five-light pendants supplied by Falk-Stadelmann; and the service room by Sugg lamps. There are also in it six gas-fires and radiators—among them a radiator by Arden Hill, one by Wright, a "Hercules" fire by Davis, the "Pansy" fire and a radiator by the Cannon Company, a Richmond "Inset" fire in coal grate, a "Dependable" fire by Main, a "Palermo" fire by Fletcher, and one by Wilson. For the provision of teas, cookers, grillers, and boilers are provided, all heated by gas.

The Lecture Room.

In the lecture room there will be good seating accommodation in the 74 ft. by 45 ft. area allotted to it. Special attention should be directed to the lighting of this hall, which is fitted by Milne and Sons with four sixteen-light "Nonpareil" ventilating sun-burners. One of the burners is fitted with a self-contained arrangement of inspection box and winch for raising and lowering when the burners require cleaning or re-mantling; and we may mention that, on application to the attendant in this room (when the room is not otherwise engaged), the burner will be lowered to demonstrate the arrangement. The burner, it will be seen, is not only a successful and economical lighting medium, but a powerful and certain ventilating medium. For table lighting on the platform, there are two Kempton lights; and seven brackets are fixed along the walls. At six points there are also heating appliances; among them a "Tintern" condenser by Main, a "Royal" fire condenser by the Cannon Company, a fire condenser by Arden Hill, and one by Wilson.

Cookery Demonstrations and Competitions Room.

Another room in which a large amount of educational work will proceed, and in which there will be many competitions, is the one that has been provided for the cookery demonstrations and competitions. Including the store, office, platform, &c., it measures 24 ft. by 45 ft.; and this we venture to think will be none too much space for the purpose. The lighting is by fifteen suspension lamps—two Podmore ones over the platform, and thirteen in the body of the room. These are of the semi-indirect type, and are supplied by the New Inverted Company. There are also half-a-dozen brackets on the walls of the room. The place is abundantly equipped with large and small cookers, heaters, and provision for hot-water supply, for the demonstrations and competitions. In fact, most makers in these lines are represented by their goods—contributions of cookers, &c., having been made by Wright, Sugg, Richmond, Main, Arden Hill, Fletcher, Davis, Cannon Foundries, Parkinson, the Imperial Company, and Vulcan.

Exhibitors' Room.

We come to the exhibitors' room, which is 30 ft. by 40 ft. This is lighted by a five-light pendant in the centre, and single and two-light brackets by the Welsbach Company. The heating arrangements comprise two fires and two radiators—the latter by Main and Arden Hill.

Restaurant and Grill Room.

This is a large room—some 105 ft. by 45 ft. The organizers and Messrs. Lyons and Co., the caterers, evidently anticipate that the extent of the exhibition and the attractions of the place warrant them in making substantial provision for general catering. We trust their anticipations will be largely realized. Here, again, we find two of Milne's "Nonpareil" ventilating-burners; but in this instance fitted with 28 inverted mantles. The more local lighting is by ten three-light candle pendants by Kempton, and fourteen three-light candle brackets around the walls, supplied by the New Inverted Company—the fittings being in oxydized copper, with old gold shades. Gas-fires and radiators are also provided. Some of the former are fixed in fire-places; and there is a special point about them. In the fire-places, there is no flue-pipe; but ventilating bricks and Ewart's ventilators have been put in. The various heating appliances here have been supplied by Richmond, Wright, Wilsons, Cannon Foundries, Imperial Company, and Arden Hill.

General.

Every one of the rooms briefly described above has the gas supply under separate control—five different services having been laid; and, the burners having been supplied with pilot lights, there is perfect individual control.

In the corridor outside the various rooms, the roof is very prettily hidden from view by bell drapery, and in all some nineteen low-pressure lamps are used, suspended from the centres of the "bells"—the lamps having been supplied by Bray, Podmore, Hands, Willey, Sugg, Helm, and Bland.

THE BANQUETTING HALL, RECEPTION ROOM, Etc.

(Gallery No. 6.)

In this gallery, the main feature is the banquetting-hall; but this and all its surroundings are to be devoted from to-morrow to the interests of the gas industry. The banquetting-room occupies some 141 ft. by 45 ft., and the reception room 59 ft. by 45 ft. There are the cloak rooms, too, and a wonderful gas-fitted kitchen in the occupation of Messrs. Lyons and Co.

The banquetting hall is decorated in a style which is not extravagant, but which gives one the sense of brightness and comfort. The principal lighting is by five 28-light Milne "Nonpareil" ventilating sun-burners. On the walls are some fourteen candle brackets, supplied by Falk, Stadelmann, and Co. The heating is by radiators by the Cannon Company, Main, Parkinson, and the Imperial Company.

The reception-room, which is tastefully furnished, is lighted by four pretty suspension lamps in the centre, with two-light and three-light brackets on the walls. Special note may be made of Ingram and Kemp's ormolu fittings, and pendants by Falk, Stadelmann, and Co. The heating is by Arden Hill, Davis, Ewart, and Wilson.

In the outside corridors, there are fifteen suspension lights; and the cloak-rooms are also suitably lighted and heated.

The Kitchen.

There was an opportunity for inspecting the kitchen that Messrs. Lyons have equipped for meeting the requirements of the exhibition. The place is lighted by 23 Sugg lamps. But the cooking installation, which looks equal to the preparation of food for a small army, is the thing that attracts. Among the plant are double roasters, salamanders, grills, hot-plates, carving-tables, vegetable steamers, steaming appliances, hot-water apparatus, tea-boilers, and a Bonecourt boiler has also been installed (outside the building) for the production of steam.

At the end of the gallery there is another lounge; and passing through it and the succeeding annexe, where more bracket and suspension lights and heating appliances are observed, we come to the final scene in the great display.

STREET LIGHTING DEMONSTRATION.

This must be seen after dusk. Light, and a perfect flood of it, is there. Lamps of all sorts have been fixed. There are high-pressure lamps on columns, and centrally suspended; and there are low-pressure high-power lamps of all kinds. Right in the centre are two Keith silica cupped lamps centrally suspended, and equipped with the Keith raising, lowering, and traversing gear, as used in the City of London. With this gear, demonstration can be made. The "Silica" cup fitted lamps on view are of 1000-candle power.

Surrounding these suspended lamps, there are on columns two Keith (1000-candle power), two Sugg (1000-candle power), and two Welsbach (2000-candle power) high-pressure lamps. In other parts of the hall, there are high-power low-pressure lamps on standards ranging from 100 to 500 candle power, by Sugg, Bray, Parkinson, New Inverted, Welsbach, Thomas Glover and Co., Anderson, Bland, Smith, Alder and Mackay, Falk, Stadelmann, and Co., Podmore and Co., and Edgar. There are also some bracket arms carrying small lighting units.

In connection with this public lamp demonstration, the Broadberry, Rostin, and Alder and Mackay pressure-wave system will be in operation; and the Gunning and the Metropolitan Meter

Company's "Simplex" systems of ignition and extinction will also be demonstrated.

Pressure registers and governors are seen in connection with low-pressure; while Sugg and Co. have provided a compressor and small gas-engine for the high-pressure street-lamps.

The following gives full details of the lamps on view:

Two 300-candle power low-pressure lamps in copper lanterns, fitted with the "A and M" lighting and extinguishing controller. (ALDER AND MACKAY.)

Two 100-candle power low-pressure lamps, similarly fitted. (ALDER AND MACKAY.)

Pressure-register, complete with clock in mahogany wood case. (ALDER AND MACKAY.)

Pressure register in glass shade. (ALDER AND MACKAY.)

Three-bracket lamps. (D. ANDERSON AND CO.)

300-candle power low-pressure lamp, fitted with the Broadberry-Rostin wave controller. (BLAND LIGHT SYNDICATE.)

Two 300-candle power low-pressure lamps, fitted with Metropolitan Meter Company's "Simplex" Controller. (G. BRAY AND CO.)

Two 200-candle power low-pressure lamps, fitted with Metropolitan Meter Company's "Simplex" Controller. (G. BRAY AND CO.)

400-candle power low-pressure lamp. (W. EDGAR.)

300-candle-power low-pressure lamp. (W. EDGAR.)

100-candle power low-pressure lamp. (W. EDGAR.)

200-candle power low-pressure lamp and wall bracket. (W. EDGAR.)

400-candle power low-pressure lamp. (FALK, STADELMANN, AND CO.)

300-candle power low-pressure lamp. (FALK, STADELMANN, AND CO.)

100-candle power low-pressure lamp. (FALK, STADELMANN, AND CO.)

Two 100-candle power low-pressure lamps, fitted with the Broadberry-Rostin wave controller. (THOS. GLOVER AND CO.)

Eight-inch pressure-gauge, attached to the supply of above lamps, an improved service cleanser, a pressure clock with 100-inch dial, a 12 and an 18 inch pressure-gauge. (THOS. GLOVER AND CO.)

Two 1000-candle power high-pressure lamps, on standards. (J. KEITH AND BLACKMAN CO.)

Two 1000-candle power high-pressure lamps, with central suspension and raising and lowering gear, as used in the City of London. (J. KEITH AND BLACKMAN CO.)

Two 500-candle power low-pressure lamps, fitted with the Broadberry-Rostin wave controller. (NEW INVERTED COMPANY.)

400-candle power low-pressure lamp, fitted with the Broadberry-Rostin wave controller. (NEW INVERTED COMPANY.)

100-candle power low-pressure lamp, fitted with the Broadberry-Rostin wave controller. (NEW INVERTED COMPANY.)

Two shadowless bracket lamps. (NEW INVERTED COMPANY.)

200-candle power low-pressure lamp. (PARKINSON AND COWAN.)

100-candle power low-pressure lamp, and wall bracket. (PARKINSON AND COWAN.)

Three bracket lamps, with new burners without air regulation. [See note under miscellaneous exhibits.] (PNEUMATIC COMPANY.)

500-candle power low-pressure lamp. (A. E. PODMORE AND CO.)

100-candle power low-pressure lamp. (A. E. PODMORE AND CO.)

500-candle power low-pressure lamp. (J. & W. B. SMITH.)

100-candle power low-pressure lamp. (J. & W. B. SMITH.)

Two 1000-candle power high-pressure lamps. (WILLIAM SUGG AND CO.)

Two 200-candle power low-pressure lamps, fitted with the Broadberry-Rostin wave controller. (WILLIAM SUGG AND CO.)

Gas engine and compressor, 500 cubic feet per hour capacity. (WILLIAM SUGG AND CO.)

One upright 200-candle power self-intensifying burner. (WELSBACH COMPANY.)

One 200-candle power inverted 14-inch square lantern, fitted with two burners. (WELSBACH COMPANY.)

Two 2000-candle power Pharos-Welsbach high-pressure lamps, fitted with automatic distance lighter. (WELSBACH COMPANY.)

THE GENERAL GAS SERVICE.

Right through the long range of buildings—occupying lineally 2100 feet—pressure recorders and gauges (by Alder and Mackay, Parkinson and Cowan, Milne, and Alex. Wright and Co.) are fixed on both the general lighting and emergency services. With these recorders the pressure will be ascertained at any point. On all the services, too, other than high-pressure ones, governors of various makes—Stott, Sugg, Milne, and Peebles—are fixed. What is being done is to get a uniform pressure right through of 3 inches on the outlet. The exhibition being in the district of the Brentford Gas Company, they are supplying the ordinary gas; and the emergency supply (to meet the wishes of the County Council) has been provided from the nearest point of the Gaslight and Coke Company's system.

The 6-inch services through the building are Mannesmann weldless steel spigot and faucet tubes with rigid joints; and, being laid on both sides of the buildings, they are belted together so as to assist in providing a uniform pressure. Connections have been made to the steel tubes by Parkinson's expanding nipple. For the emergency lighting, the building is run with 2-inch pipes.

Regarding the Mannesmann tubing and the rigid joint used in the piping of the building for the ordinary supply, there is no question that this type of tubing is rapidly superseding the ordinary spigot and faucet joint. The Brentford Company, we understand, have used it in large quantities; and it is also now employed by the Gaslight and Coke Company, South Metropolitan Company, Manchester, Glasgow, Leeds, Edinburgh, Belfast, Newcastle, and most of the other principal gas undertakings of the country. The tubes installed by the Brentford Company in the exhibition buildings are not, as is usual, covered with prepared jute cloth. The following shows the lengths of tubing and the connections required in the different halls:—

Halls, &c.	Six-Inch Tubing.	
No. 1	420 ft.	Ten standard quarter bends.
No. 2	360 ft.	Four standard bends, six collars, one special bend.
No. 3	771 ft.	Two standard and one special bend.
No. 4	171 ft.	Four special bends.
No. 5	628 ft.	Four standard bends.
No. 6	166 ft.	Four special bends.
No. 7	848 ft.	Three special bends.
No. 8	652 ft.	Five standard bends.
No. 9	145 ft.	Two special, two standard bends.
No. 10	1087 ft.	Four standard bends, six 3-inch standard bends, two special bends.

This is an interesting table; and it gives some idea of the vast amount of ground preparation work that had to be done in connection with the gas supply for the exhibition. The industrial section, by the way, had to be piped with 8-inch ordinary mains to meet the requirements there.

Mention is made in the course of the general description of the furniture for the domestic exhibits having been supplied by Mawers, Limited. To complete the credit, it may be noted here that the wall papers were supplied by Messrs. Sandersons and Sons, of Berners Street, W.; the clocks by Messrs. Stockall, Marples, and Co., of Clerkenwell Road; the mantelpieces have been loaned by Messrs. C. Pratt and Sons, of Brompton Road, and Messrs. Bratt, Colbran, and Co., of Mortimer Street; the pianofortes used are Brinsmead's; the marble surrounding the fireplaces is by Messrs. Burke and Co., Rathbone Place, W.; the tiles are by Martin Van Straaten, Little Britain, E.C.; artists' requisites in studio are by Messrs. Reeves and Co.; and the pictures in the model rooms were placed at disposal by the Medici Society, of Grafton Street, W. There has been excellent attention to detail in this exhibition.

This brings us to the end of the sketch of what is to be seen at the National Gas Exhibition. The sketch is imperfect in many respects, as it is impossible in an exhibition of this kind to note everything that is to be seen, where it is to be seen, and to whom credit is due for its production or supply. To mention all these points would have made this descriptive outline unreasonably long, and very heavy reading.

Our final words to all concerned are: "Well done. May the accomplished work be rewarded with the abundant success that it richly merits."

PLANS, DRAWINGS, MODELS, &c.,

AS SEEN AT THE NATIONAL GAS EXHIBITION.

IN order not to interrupt the continuity of the general description of the exhibition, we have removed from our notes on Gallery No. 4, the descriptions of the photographs, drawings, models, &c., so far as we have, at the time of writing, been able to secure them. The notes are given in the alphabetical order of the names of the exhibiting firms.

ASHMORE, BENSON, PEASE, AND CO., LIMITED.

This firm are exhibiting a model of a modern Mond gas plant, to gasify 120 tons of coal per day of twenty-four hours, with sulphate of ammonia and tar recovery apparatus. A few notes as to the working of the plant will be of interest. The coal is raised by means of an elevator and conveyor into a large overhead bunker, extending the whole length of the producer, from which it is fed into any one producer through the feeding-hopper. A superheated saturated blast enters the producers at the level of the fire-bars, and the resulting gas passes first through the superheater, which raises the temperature of the incoming air to the required point, then into the ammonia absorber, where it meets a spray of dilute sulphuric acid solution, which extracts the ammonia. The gas next passes into the washer, which contains water agitated by mechanical dashers. This removes a portion of the tar and dust, and partially cools the gas; the gas finally passing through the cooler, where it meets a continuous circulation of cold water, and where the bulk of the tar is removed. The cooled gas is then led away to the works, or to a further purification plant when intended for use in gas-engines. The sulphate of ammonia liquor which is drawn off from the absorber is taken into the stock liquor tanks, where it is allowed to settle, after which it is pumped into the sulphate-house and evaporated, yielding solid sulphate of ammonia of good quality, which finds a ready sale. The tar collected from the plant is elevated into a tar-separator,

where the bulk of the water is removed, and the tar is then ready for sale. It will probably be of particular interest to readers of the "JOURNAL" to note that Mond gas produced from coke breeze or screenings is now being used for firing gas-retorts, with considerable economy as compared with coke-fired internal producers, and with equal efficiency and control of the heating. A battery of Mond producers is at work at the Redheugh Gas-Works of the Newcastle and Gateshead Gas Company for supplying ten beds of retorts, carbonizing 1000 tons of coal per day. The firm have in hand a large ammonia recovery installation of five producers for the Saltley Gas-Works of the Birmingham Corporation. The plant is designed to gasify 90 tons of pea-nut coal per day, and produce gas of 135 B.Th.U. per cubic foot to heat 66 Koppers' chamber ovens. This order is the outcome of the success of a trial plant of one producer laid down at the Saltley works, which worked under similar conditions. A paper on the subject was read at the Institution meeting last June. The firm also exhibit four photographs of different types of gas-producing plants. They are also showing two large photographs of the four-lift gasholder recently completed for the Manchester City Corporation Gas Department for their Bradford Road works, in various stages of erection. The holder has a capacity of 10 million cubic feet of gas.

HENRY BALFOUR AND CO., LIMITED.

This firm have supplied a few photographs and a small model, which will be found of interest to gas-engineering visitors.

FIRTH BLAKELEY, SONS, AND CO., LIMITED.

This firm are exhibiting six photographs as follows: (1) Gasholder and steel tank erected at Littlehampton. (2) Gasholder erected at Wotton-under-Edge Gas-Works. (3) Water-tower erected at Aldershot. (4) Coke-oven and bye-product plant erected at Wharncliffe. (5) Purifiers erected at Alva Gas-Works. (6) Complete gas-works erected at Keady.

CHEMICAL ENGINEERING COMPANY AND WILTON'S PATENT FURNACE COMPANY.

This firm are exhibiting a photograph of a sulphate of ammonia plant, erected by them at the Cardiff Gas-Works; a diagram of a sulphate of ammonia plant; a photograph of a sulphate of ammonia plant on the direct-recovery process, erected at the First Garden City Gas-Works, Letchworth; a diagram of the direct-recovery sulphate plant; a photograph of the tar dehydration plant as used at the Woking Gas-Works; a photograph of a complete tar distillation plant; two photographs of a benzol rectification plant; a photograph of sulphuric acid chambers; and a photograph of plant for producing household or liquid ammonia from sulphate, as erected at the Mill Hill Gas-Works. They are also showing a scale model of their direct-recovery sulphate of ammonia plant, which it is anticipated will excite much curiosity. It is to this that the firm wish to draw particular attention.

CLAPHAM BROTHERS, LIMITED.

This firm are exhibiting some thirty to forty photographs of all kinds of gas-works plant supplied and erected by them in all parts of the country and abroad. There are several of which special note may be made. One is a large picture of three of the twenty sets of Clapham's patent "Eclipse" water-tube condensers, as supplied to the Gaslight and Coke Company. The total capacity of the condensers (all of which are similar to the ones in the picture, and are now in operation) is 40 million cubic feet per day. Another one shows six 60 ft. by 33 ft. by 6 ft. deep purifiers, fitted throughout with Clapham's patent "Eclipse" automatic fasteners and rubber joint. These were erected a short time ago for the Coventry Corporation. There is yet another interesting picture, taken at Douglas (Isle of Man), of four purifiers, also fitted with the "Eclipse" rubber joint and automatic fasteners. The special feature of this picture is that it shows the application of the patent "Triumph" valves to purifiers. There is an interesting photograph showing twelve elevated purifiers, each 35 feet square, of the water-lute type, together with the structural work on an area of 4444 square yards, and in which 2490 tons of steel and ironwork were used. The firm are also exhibiting a good photograph of a Clapham's "Eclipse" ball washer-scrubber in course of erection at Singapore. This is interesting, inasmuch as it shows the internal construction of the machines. Other photographs include retort-bench ironwork, Clapham's patent "Eclipse" Pelouze and Audouin tar-extractors, elevating and conveying plants, Livesey washers, naphthalene washers, structural steel work, &c. On exhibition, too, is a full-sized model of the patent "Eclipse" rubber joint and rapid automatic fasteners; also a model showing the rubber joint as secured to the purifier covers. Both these models show the great advantage of the method over the older systems. The firm also exhibit a pyramid composed of wood balls as used in the "Eclipse" ball washer-scrubber; a machine, dealing with 1 million cubic feet of gas per diem, will contain approximately 137,700 of these balls. The balls forcibly display the great amount of freshly wetted surface and scrubbing power presented to the gas as it passes through the machine; and, it is stated, without increasing the back-pressure.

CLAYTON, SON, AND CO., LIMITED.

This firm have on view sixteen frames containing photographs of gasholders, roofs, hoppers, bridges, &c. They show the latest designs, and are self-explanatory.

SAMUEL CUTLER AND SONS.

This old-established firm occupy a prominent position, with an interesting display of gasholder photographs. As the firm have been well to the fore in gasholder construction for over fifty years, they can naturally show a comprehensive selection ranging from the largest to the smallest. The commencement of the era of large gasholders is exemplified by a photograph of the two Birmingham gasholders, each of 6½ million cubic feet capacity, erected under Mr. Charles Hunt; and it is somewhat of a surprise to find that over a quarter of a century has elapsed since these were put into use. The 8 million cubic feet gasholder erected at the Kensal Green station of the Gaslight and Coke Company ranks next chronologically; and to come to recent years, there is the Sheffield 8 million cubic feet holder in which flying lifts are made a prominent feature. Messrs. Cutler have a deservedly high reputation in regard to the erection of gasholders abroad, and show illustrations of many important ones not only in European countries, but in Asia and America. We notice several recent constructions in Italy, including three large holders with steel tanks at Rome, and others at Turin, Milan, &c. We are, in fact, informed that practically every gasholder of any considerable dimensions put down in Italy during the last seven years has been constructed by this firm. Steel tanks are very much in evidence; and a large number of the gasholders have guide-framing of the "Cutler" type, which is more especially well suited for combining with steel tank construction, and for shipment and erection abroad. Several photographs, illustrating modern methods of erection, including pneumatic rivetting of tanks and the erection of guide-frames from the inflated gasholder are shown; and the impression one gathers from the whole collection is that the firm are maintaining their high engineering repute.

R. & J. DEMPSTER, LIMITED.

This firm are exhibiting a large photograph of a three-lift "Bearscot" improved spiral-guided gasholder in a steel tank; and this holder has been painted so as to improve the general flat appearance the type usually presents. It has been fitted with the latest type "all-steel" expansion guide carriages; those for the outer lift having four rollers. The upper end of each spiral guide is also fitted with a bracket, forming a stop, which would prevent the gasholder running out. It has also extended side sheets, which conduct any water from the crown down the spiral guides; thus obviating the discoloration of the paint, as is generally seen upon holders in manufacturing districts. It also protects the paint on the side sheets by arresting the sulphur deposits on the crown. The ladder on the two inner lifts is also "Collapsible," and automatically closes into a very small compass. In another frame is shown the latest type of "twin" rail adopted for large gasholders, and also a method of fixing new holding-down bolts to existing tanks without injuring the tank wall. A rather amusing illustration is to be seen in the "Scrubber and Washer" section, suggesting how to deal with the "colour" question. It shows a coloured gentleman being passed through a Pelouze and Audouin apparatus, which very effectively appears to change his nationality. Illustrations of some particularly large exhausters are shown—one design to pass 6 million cubic feet per hour of a type not usually associated with gas-works.

ROBERT DEMPSTER AND SONS, LIMITED.

This firm are exhibiting pictures to illustrate their system of intermittent vertical retorts—fully described by us when dealing with the installation made by the firm at Cleethorpes.

BRYAN DONKIN COMPANY, LIMITED.

This firm are showing the following:

Section I.—A view of various types of service clamps and high-pressure cocks of the Mueller type now made by them. These, we learn, are being supplied in large numbers by the Bryan Donkin Company, who are the sole manufacturers for the United Kingdom. A photograph showing views of nine different types of regulators. A speciality shown is a new design of cheap regulator for fixing on meters.

Section II.—Two views of Reynold's patent district governors, as supplied to the King's Norton governing station of the Birmingham Corporation. The governors have a maximum capacity of 150,000 cubic feet per hour, and are suitable for an inlet pressure varying from 1 lb. to 20 lbs. per square inch. They maintain a constant outlet pressure of 35-10ths, which is capable of adjustment from 10-10ths to 50-10ths water pressure. Whatever outlet pressure the governor is set to, it remains constant throughout all changes in consumption (from *nil* up to the maximum). The firm have in hand a duplicate set of governors for the Harborne Station of the same Corporation. There is also a view of Reynolds' patent district governor for high-pressure gas distribution. This governor is capable of maintaining the pressure constant on the district independently of all variations, both in the demand for gas and in the pressure on the inlet side. The firm have supplied this governor to practically all the high-pressure installations in the United Kingdom. Regarding high outlet pressure governors of the district type, there is a view of governors supplied to the Tynemouth Gas Company for the lighting of a large number of high-pressure lamps. These governors are working against an inlet pressure of 17 to 20 lbs. per square inch, and reducing this pressure to 3 lbs. per square inch. The outlet pressure of 3 lbs.

is maintained throughout all changes in the consumption and inlet pressure. The outlet pressure is adjustable, and can be increased to 4 to 5 lbs.

Section III.—Here is a view of the exhauster-house at the Hornsey Gas-Works; all the plants shown being of the firm's manufacture. A view is to be seen of the exhauster-house at the Canons' Marsh station of the Bristol Gas Company. Another photograph is of three sets of exhausters electrically driven through worm-gearing running in an oil-bath, fixed in the exhauster-house of a large coke-oven bye-product installation in South Wales. Other views are as follows: Exhausting plant, with steam-engine of the vertical enclosed type, fitted with forced lubrication; the exhausters being of special design. This plant was supplied to the Bromley Gas-Works. Exhauster, motor driven, through cut helical gearing. A small gas-exhauster combined on the same cast-iron base-plate with a horizontal gas-engine. This plant is specially suitable for small gas-works. One or two sets of exhausting plants just put in at the Gaythorn Gas-Works of the Manchester Corporation. Each of these sets is capable of passing 200,000 cubic feet per hour. Plant installed at the Southend Gas-Works—two sets having been supplied, each for a duty of 50,000 cubic feet per hour. The engines are fitted with bored guides. Two Rateau gas-fans, driven by steam-turbines, each to pass 500,000 cubic feet per hour against 11 inches pressure at 1880 revolutions per minute as fixed at the Grangetown Gas-Works, Cardiff. A Rateau gas-fan driven by steam-turbine, with diaphragm pressure regulator, to pass 150,000 cubic feet per hour, against 20 inches pressure, at 3500 revolutions per minute. This is one of two sets supplied to the Belgrave Gate Gas-Works of the Leicester Corporation. A Rateau gas-fan driven by electric motor, supplied to the Adderley Street works of the Birmingham Corporation. This is capable of passing 400,000 cubic feet per hour at 1875 revolutions per minute. The firm are the manufacturers, under licence from Professor Rateau, of these fans for pressure-raising and gas-compressing purposes; the special points being high efficiency, no internal rubbing parts, small cost of upkeep, absence of pulsation, silent running, and ample gas-way through fan.

Section IV.—Shown here is one 52-inch rack-and-pinion valve, with chain gear, water-sealed gland, and bye-pass. A view of the firm's rack-and-pinion valve which they have been making since 1847, and of which they now supply about 10,000 per annum. A view of their patent high-pressure gas-valve, double-faced, with sockets, suitable for a Mannesmann steel tube rigid joint. This valve the firm have introduced to meet the demand for a high-pressure gas-valve; and they guarantee it as being an absolutely tight gas-valve for use with high-pressure mains. This valve has been adopted by, among many other works, the Birmingham Corporation.

Drakes Limited.

Photographs descriptive of various plant are being shown by this firm. Some enlarged photographs are seen of horizontal installations, showing the construction of steel house and roofs, and the filling of walls in progress; also the erection of coal and coke handling plants, as well as the building of retort-benches. There is interest here. There is also a display of photographs of various classes of plant, such as huge scrubbers, condensers, benzol tanks, &c., in connection with large coke-oven installations. In addition, photographs are shown of the firm's patent charging and discharging machines for horizontal retorts; the machines being both separate and combined. Some photographs show the machine in actual operation at the Sowerby Bridge Gas-Works, and as a contrast there are photographs entitled, "Charging, Drawing, and Clinkering," which operations are shown on direct-fired beds. The old and new methods are shown in one frame. Among other views in the elevating and conveying line, there are seen gravity-bucket conveyors, push-plate conveyors, and complete coal and coke plants, as erected at the Beckton Gas-Works of the Gaslight and Coke Company.

Gibbons Bros., Limited.

The most significant of this firm's exhibits are a complete cross section of a modern retort-house, showing all up-to-date appliances for the handling of coal and coke, and an installation of a Guest-Gibbons charging and discharging machine. The firm wish to call the attention of all gas managers to the important part played by the latter in obtaining good results in the retort-house. As has been already shown in many instances, the best results have been obtained with horizontal retorts and heavy charges. The Guest-Gibbons machine will practically fill retorts any length or section, allowing only enough space for the easy exit of the gas to the ascension-pipe. Attention is also directed to the telpherage system of removing coke from the retort-house, as being the most brief and cleanly method. The firm's regenerative settings are of such world-wide fame that a lengthy description is hardly necessary. Nevertheless, it may be mentioned that they are exhibiting three drawings and numerous photographs in illustration of the latest type of settings. The drawings are: (1) A Gibbons and Masters' patent "A.B.C." tile regenerative setting; (2) a Gibbons and Masters' patent "horse shoe" block regenerative setting; and (3) a Gibbons and Masters' patent tube regenerative setting. A drawing is exhibited of a coal and coke handling plant for use in boiler-houses. By no means the least interesting of the exhibits is a detail drawing of one of the latest charging-machines.

B. Gibbons, junr., Limited.

This firm are restricting their exhibits to views of the works; and they desire to call attention to the great increase in the size of the capacity of their plant, and the vast output of all kinds of fire-clay, silica goods, and retorts. They also point to the high standard they have attained in refractory material production during the last few years. A diagram is seen of the firm's retort output.

Head, Wrightson, and Co., Ltd.

Photographs are shown by this firm of "Nota nos" pan ash-washers as erected at the Blackburn, Birkenhead, Plymouth, and other gas-works. Test samples are also displayed of unwashed pan ash, recovered coke, and extracted clinker. A description of the "Nota nos" pan ash-washer, as designed for the Birkenhead Corporation, may be of interest. The pan ash is conveyed from the retorts, and fed into the boot of an elevator, where it is raised to a suitable height, and fed on to a sizing tray attached to the washer; the washer being carried on a light structure 10 feet from the ground. The small pan ash, $\frac{3}{8}$ inch to $\frac{1}{2}$ inch, is taken out by the tray before washing, and deposited down a shoot into small tubs. The oversize passes over the tray, and is fed into the washer at a suitable point, where it meets a flow of water—the action of the machine separating the coke or material of a like specific gravity from the clinker. The coke is carried down the trough with the flow of the water, passes over an adjustable weir on to a draining-tray fitted with fine perforations, and is thoroughly drained while being slowly conveyed over it. The coke, after passing over the draining-tray, is conveyed forward over a series of perforated plates, where it is sized to suit the market requirements, and fed on to the ground for storage. The clinker or like material is conveyed up the trough against the flow of water, and in the opposite direction to that of the coke, and fed down a shoot at the side on to the ground. The water supply is taken from a settling-tank in the ground by means of a pump; the dirty water, returning through the draining-tray, being led back to the settling-tank to be clarified. The washer-trough is driven by means of a Marcus patent propulsion gear securely bolted to a concrete bed. The elevator boot is fitted with a grid to prevent large pieces of coke or clinker being fed into the elevator. The capacity of this plant is 5 tons per hour, and the power necessary for driving it is 12 to 15 horse power.

W. C. Holmes and Co., Limited.

The photographs and coloured drawings this firm are exhibiting are of contracts recently carried out in condensers, tar extractors, rotary and centrifugal scrubber-washers, valves of all types (including their well-known double-faced valve), purifiers, and gas-holders and sulphate of ammonia and tar plants. Matters of special interest in the exhibit include a large-scale drawing of the 4 million cubic feet gasholder at present under construction at the Huddersfield Gas-Works, and centrifugal type washers (Liversedge and Davidson's patent) for ammonia of 6 million cubic feet capacity per day each on order for Birmingham. These washers are of the design Dr. Davidson, of Birmingham, is using for his continuous liquid purification process, which he described at the annual meeting of the Institution of Gas Engineers. There are also plans and photographs of a continuous tar distillation plant of an entirely new type, which should be of much interest. Tar may be continuously distilled either to the point of simple dehydration for road-tarring purposes, or else entirely for pitch-making. Any number of fractions of the distilled oils may be obtained. The great achievement of this plant is that the distillates and the pitch (once the initial adjustment has been made) flow away from the plant continuously without variation; unskilled labour only being required for the manipulation. The initial cost of the plant is considerably lower than the old-fashioned type of still, and the cost of operating less than half.

W. J. Jenkins and Co., Ltd.

The drawings, photographs, and models that this firm are exhibiting include the following: *Coke Handling Machinery*—Photographs of coke-conveying plants, showing various types of conveyors, with screening and storage arrangements. Model of a typical retort-house conveyor, showing arrangement in relation to retort-bench. A photograph illustrating the construction of the well-known "D.B." patent coke-conveyor chain. A photograph of coke telpher plant. This is installed in conjunction with a conveyor in the retort-house; and the photograph shows the arrangement of track, hoppers, screens, &c. Photographs showing one of Goodall's patent coke-quenching screening and loading machines as installed on the coke-oven plant at the Saltley works of the Birmingham Gas Department. *Coal Handling Plants*—Photographs showing typical arrangement of coal receiving, screening, and breaking plants. Drawing of a large telpher coal-handling plant, with a thousand-ton storage bunker. Drawing of mono-rail coal telpher, with grab. *Stoking Machinery*—Photographs showing various types of the "D. B." charging and discharging machines, as well as a model of a "D. B." projector. *Carbonizing Plant*—A drawing of the Wilson-Glasgow vertical retort installation. A set of photographs showing important details of the in-

stallation, as well as one of "Simmonds" anti-dip pipe and valve. A model of "Brookes' patent" automatic primary and secondary-air regulator. This is the arrangement mentioned by Dr. W. B. Davidson in his William Young Lecture as having resulted in such extraordinary economy in fuel consumption. *Distribution*—A model of safety locking gear for the locking of gasholder-valves. *General Remarks*—As regards the coke-conveying plants, the "D. B." hot-coke conveyor is already so well known that there is no occasion to enlarge on its merits; but it may be said that already the firm have made over 7 miles of this conveyor. In cases where conveyors cannot be conveniently installed on account of local conditions, a telpher installation often meets the requirements of the site; and, as will be seen from the photographs, the firm have installed a number of these plants. The Goodall quencher has only recently been introduced into gas-works; but it is already well established in the coke-oven industry, and has proved itself a most efficient means of economically handling large quantities of coke. Charges up to 12 tons are being dealt with. A drawing of the telpher coal-handling plant shows an installation now being erected by the firm in London. Concerning "D. B." stoking machines, we learn that over 200 of these have already been installed; and, as published figures show, they have proved themselves most economical for dealing with heavy charges in horizontal retorts. The Wilson-Glasgow vertical retorts, although originally designed for carbonizing Scotch coal, have proved to be eminently suitable for English coals, especially those of a intumescing nature.

Kirkham, Hulett, and Chandler.

This firm are showing photographs of their patent "Standard" washer-scrubbers and patent "Standard" centrifugal washers. It may be mentioned as a point of interest that the latter have largely superseded the old style horizontal machines. The photographs show the centrifugal washers erected at the Gaslight and Coke Company's Beckton, Stratford, and Fulham stations; also at the Southall station of the Brentford Gas Company, and at Newport (Mon.), Cambridge, Ipswich, Basingstoke, Salisbury, Wellington (Salop), &c.

Lead Wool Company, Limited.

Accompanying two framed show cards, this firm are exhibiting three model joints, one an ordinary yarn and lead wool joint, one double collar joint in cast-iron pipe, and one rigid in a Mannesmann tube pipe. This type of joint has been used for many miles of high-pressure gas-mains, and has been tested to the highest pressures without leakage. The firm points out that lead wool joints for steel pipes give the combination of unbreakable pipes and absolutely tight joints.

Leech, Goodall, and Co.

By this firm there is being exhibited a complete model of one bed of eighteen 4-metre Dessau vertical retorts. They are also showing photographs of Dessau installations, horizontal and inclined retorts, elevating and conveying plant, coal breakers, and sprinklers for hot-coke conveyors. Also a photograph, showing a section of a Dessau vertical retort after working 2000 days.

Mobberley and Perry, Limited.

This firm have on view a selection of fire-clay goods, including various kinds of retorts—vertical, inclined, horizontal, and segmental. They are also exhibiting a vertical retort in segments, part of which is calcined, and part in the green state, thus showing the slight shrinkage caused through the calcining process, and demonstrating the quality of the "Old Mine" Stourbridge fire-clay. The firm are proprietors of large areas of the famous "Old Mine" Stourbridge fire-clay, and are exhibiting pieces of the clay as drawn out of the mines, also similar pieces calcined. We learn that they have always in stock "weathering and maturing" at least 30,000 tons. The firm are also proprietors of a large quantity of the "Blue Staffordshire Marl," and exhibit some sample blue-bricks, showing their complete vitrification; thus proving their suitability for the paving of retort-houses and coal and coke stores. The firm are also showing photographs of their various works—"The Hurst," "The Hayes," "The Himley," as well as their Staffordshire red and blue brick-works. Photographs likewise illustrate the bulk of material as drawn out of mines; its course of manufacture; and the vertical, inclined, horizontal, and segmental retorts and other fire-clay goods ready in the works for transit, together with a view of a large quantity of calcined grog, which is exclusively used in the manufacture of the "B.B." (Best British) brand of material.

Newton, Chambers, and Co., Limited.

Some photographs are displayed exemplifying work that the firm have carried out in this and other countries. The firm boast a very long history, as will be seen by two photographs of their works—one referring to 1793, and the other to 1911. Interest will attach to the history that they disclose. Then there are photographs of scrubbers erected at Buenos Ayres and at Glossop. Examples of gasholder work are supplied by Bloom Street, Salford (capacity 300,000 cubic feet), Shirebrook (100,000 cubic feet), Norwich (1,120,000 cubic feet), Darlington (1,250,000 cubic feet), Gaythorne Gas-Works, Manchester (560,000 and 1,500,000 cubic feet), Warrington (1,170,000 cubic feet), Southwell (100,000 cubic feet), Wolstanton (300,000 cubic feet), Sittingbourne (535,000 cubic feet), Sittingbourne (second holder of same capacity), Inverness (360,000 cubic feet), and Horley (320,000 cubic feet). Retort work is illustrated by Buenos Ayres and the Neepsend Gas-Works, Sheffield; coal-bunkers by Buenos Ayres; purifier-houses by Glossop, with photographs of covers and connections, showing Weck's valve. Illustrations are given of purifiers at the Draycott Gas-Works and at Stourbridge; of a retort-house, showing roof, at Birmingham; of a Livesey washer; of a battery of six water-tube condensers; of a Woodward gas-valve; and of coke-storing apparatus at the Gaythorne Gas-Works, Manchester.

Parkinson and W. & B. Cowan.

This firm have a collection of exhibits, in addition to those referred to in connection with the notice of the meter stand in the industrial hall. The more modern articles in the following list of exhibits are the high-pressure meters (wet and dry), the high-pressure governor, and the calorimeter. The productions shown comprise a pressure register, two 12-inch gauges and models of an anti-fluctuator, water-meter, rain-gauge, square station meter, round station meter, station governor, and test gasholder. There are twelve framed photographs showing various apparatus, a case containing nickel-plated gauges, a recording calorimeter, a No. 20 high-pressure cylindrical wet meter complete with compensating index and geared cocks, a No. 100 high-pressure dry meter, and a ½-inch "Shorts" high-pressure governor.

Stewarts and Lloyds, Limited.

The principal features of this firm's exhibit are: A model (quarter size) showing the new method of welding together steel gas-pipes *in situ*. The pipes are wrought steel lap-welded, and are manufactured in all sizes up to 48 inches, and in lengths up to 40 feet, for welding together in long continuous lines. Full sized joints of the patent method—in section—are also exhibited; showing the construction. It will be observed that all bending stresses on the joint are taken by the telescoped ends of the pipe, which are slightly tapered so as to form a driving fit, the one into the other, the weld taking the place of the lead, and forming an absolutely tight and permanent joint. Welding is effected quite readily by means of a special burner consuming mixed oxygen and acetylene. Illustrating the advantages of this method of jointing, it may be mentioned that a 4-inch main can be jointed and laid (even in trenches as deep as 6 or 8 feet) at the rate of 150 feet per hour. A selection of well-known steel pipe joints, in section, is also shown, including the "Inserted" and "Long Sleeve Inserted" patent lead and yarn joints. A model steel high-pressure steam-pipe is exhibited with branches, drain pocket, and flanges welded on. A comprehensive collection of small steel and iron screwed and socketed tubes and fittings for steam, gas, water, &c., is seen. There are also many interesting photographs of specimens of pipework.

Joseph Taylor and Co.

This firm's exhibit consists of a series of framed photographs, showing saturators and leadwork of their make, in connection with the manufacture of sulphate of ammonia. Having delivered over 460 saturators, the firm have a good selection for photographing. The photographs shown illustrate types of their hand-fishing, steam-ejecting, or self-emptying saturators, for either gas-works or coke-oven installations, and made from solid rolled virgin-plate lead. Seal-pots, acid eggs, acid tanks, sulphate draining tables, lead pipes, bends, &c., are also to be seen on the photographs. Drawings are shown of designs for sulphate of ammonia plants, solid-plate lead saturators, &c.

C. & W. Walker, Limited.

Photographs and models by this firm illustrate some of the patented plant in connection with the purification of gas for which they have long been well known. The models include Milbourne's patent "Duplex" valve used for working purifiers. The features of this valve are its ready accessibility and its convenience for fixing in any part of the purifying-house, or outside it if preferred, and at any level. The valve disc is hung vertically—thus reducing the possibility of any deposit on its surfaces or seatings. The body is provided with manholes through which the discs can be taken out and replaced if this should be found necessary. There is also Milbourne's patent "Trinity" valve, which is a combined inlet, outlet, and bye-pass valve, taking the place of three ordinary slide-valves. One of the advantages said to be obtained by using the "Trinity" valve is the automatic opening of one port before another is closed. Only one spindle has to be operated; so that there is no possibility of any error, such as closing the bye-pass before opening the inlet and outlet valves or *vice versâ*. The valve is applicable to almost any part of the plant of a gas-works, and may also be used with advantage to prevent the mishap (which has occasionally happened) of shutting-off one gasholder from the district before opening the outlet-valve of another. A further model shows Milbourne's patent rapid fasteners for purifier-covers, by which the holding-down arrangements of a luteless cover are all brought into action at exactly the same instant. The effect of this is to ensure uniform pressure all round the rubber joint, which it is impossible to obtain with any system of bolts or cotters, &c. This patent fastener has been so generally adopted that it is scarcely necessary here to make any further

reference to the other advantages attending its use. A model is also shown (full size) of Milbourne's patent rubber joint for luteless purifiers, which is fixed to the cover without any disturbance of the face which forms the joint between the steel cover and the cast-iron box. Another model which will prove interesting is of the "Milbel" patent grid, which is also the invention of Mr. R. J. Milbourne. It will be seen that this grid departs from all previous forms, and consists of a series of shelves set at a slight angle, and not in vertical alignment; the result being that the oxide is distributed on the various shelves, and a much larger surface is exposed to the gas than is the case with the ordinary or vertical forms of grid. The sloping boards are separated by conduits extending from side to side of the purifier; access being given to all these conduits simultaneously from a passage formed along one side of the purifier. The grid has the advantage of economy in both first cost and maintenance, while the distribution of gas over the whole area of the purifier by its use insures the complete and uniform fouling of the oxide. The grids are in successful use at various works, and are being adopted in other large gas-manufacturing stations. A model is also shown of a purifying-machine for the extraction of tar, carbonic acid, sulphuretted hydrogen, and ammonia, by washing in ammoniacal liquor, and by minute subdivision of the gas bringing it in contact with a large area of freshly-wetted surface. On the chemical side of this firm's business, a model of a still for the distillation of ammoniacal liquor is on view, the feature of which is the absence of any wrought iron or steel inside the still, and the efficiency with which the liquor is made to travel across the diameter of the still. The easy removal of the hoods, and the absence of joints in contact with the liquor, are also important advantages of the still. A number of photographs are exhibited, showing condensers, purifiers, purifying-machines, sulphate of ammonia plant, and gasholders erected by the firm in various parts of the world, including Canada, Australia, Chili, &c.

George Waller and Son.

This firm have on view the following enlarged photographs: Steam-driven exhausting machinery, twin sets, each set dealing with 300,000 cubic feet of gas per hour, "C" type; twin sets of exhausters, each set for 200,000 cubic feet per hour, "D" type; an exhauster set for 100,000 cubic feet per hour, "A" type; an electrically-driven exhauster set; a steam turbo-driven exhauster set; a gas-engine driven exhauster set; an exhauster set driven by vertical steam-engine; twin exhausters and compound engines at the Melbourne Gas-Works; duplex reciprocating gas-compressors with gas-engines; rotary gas-compressors with gas-engines; turbo-driven boosting fan for light pressure; and turbo-driven boosting fan for high pressure.

West's Gas Improvement Company, Limited.

This exhibit has entire reference to the Glover-West vertical retort installations. It includes: A model of a Glover-West vertical retort-setting, illustrating the principles of continuous carbonization in vertical retorts, and the action of the heat on the charge during its descent through the retort; the method of cooling the coke before it is discharged to the coke-receiving chambers, and the utilization of the heat of the residual coke by heating the secondary air supply for the combustion with the producer gas in the separately heated combustion chambers, as well as the passages at the top of the setting for the circulation of the waste gases before they leave the setting, and pass away to the chimney. The model also explains the method of supplying the coal from the overhead bunker, as well as the discharge of the coke by coke-extractors at the base of the retorts. There are also on view eleven drawings of the Glover-West vertical retort plants, including the plants in operation or in course of construction for: Manchester, with a capacity of 4 million cubic feet a day; Sydney (third installation), capacity 6 millions; Liverpool, capacity 5 millions; Cardiff, capacity 2½ millions; North Sydney, capacity 2½ millions; Exeter, capacity 1¼ millions; Gothenburg (Sweden), capacity 1 million; Macclesfield, capacity 1 million; and Cambuslang, capacity ½ million. There are also twelve photographs of the Glover-West vertical retort plants at Rochdale, Helensburgh, St. Helens, Manchester, Belfast, Nelson, and Heywood.

Willey and Co., Limited.

This firm are showing the "Pickering" patent dry-faced centre-valve. This centre-valve is arranged to work a set of four purifiers in rotation, and is constructed in such a manner that any number of the four purifiers may be in action at once. The top of the valve can be designed for attaching directly to the underside of the purifiers, or may be covered with plates having flanged branches cast on for connecting to separate inlet and outlet pipes. It can also be made to suit any arrangement or number of new or existing purifiers. The following table shows the combinations which can be used with this centre-valve.

Inlet at 1, 2, 3, 4	outlet	Inlet at 1, 2	outlet, 3 and 4 off
,, 2, 3, 4, 1	,,	,, 2, 3	,, 4 ,, 1 ,,
,, 3, 4, 1, 2	,,	,, 3, 4	,, 1 ,, 2 ,,
,, 4, 1, 2, 3	,,	,, 4, 1	,, 2 ,, 3 ,,
,, 1, 2, 3	,, 4 off	,, 1	,, 2, 3, 4 ,,
,, 2, 3, 4	,, 1 ,,	,, 2	,, 3, 4, 1 ,,
,, 3, 4, 1	,, 2 ,,	,, 3	,, 4, 1, 2 ,,
,, 4, 1, 2	,, 3 ,,	,, 4	,, 1, 2, 3 ,,

Woodall-Duckham Company, Limited.

An interesting display is made by this firm; their exhibits consisting of: (1) An exact model of a setting of four retorts on the Woodall-Duckham system, specially made in sections, so that the arrangement of flues may be readily seen and appreciated by gas engineers. (2) Four framed drawings of the installation erected by the Woodall-Duckham Company for the Birmingham Corporation, of a capacity of 5 million cubic feet per twenty-four hours. (3) Frame containing photographs of the Woodall-Duckham system at Budapest, Strandvej, Toulouse, and Yokohama. The striking appearance of the Toulouse retort-house will no doubt catch the visitor's eye; being more like a villa than a retort-house. (4) Framed photograph of the bottom discharging apparatus, complete with water-sealed door. (5) Diagrammatic illustration of the Woodall-Duckham system. (6) Framed photograph of the top of the setting of a Woodall-Duckham installation. (7) Photograph showing the large amount of free space beneath the settings obtainable under the Woodall-Duckham system. (8) Photograph of the Woodall-Duckham installation at Strandvej, Copenhagen. (9) Water-colour painting depicting the smoke, steam, flame, &c., which appertain to a horizontal retort-house. This is exhibited merely as a contrast.

MISCELLANEOUS EXHIBITS

At the National Gas Exhibition.

There are a few exhibits to which, at the time of writing, there had been (to the best of our information) no definite allocation of space. We therefore mention them separately. It may, however, be taken that they will be somewhere in the gallery in which the models, drawings, &c. (Gallery No. 4), are to be found.

Donald Macpherson and Co., Limited.

The firm are exhibiting small iron plates of gasholder sheeting, showing the effect of the various shades of their metallic oxide paint, which they supply for painting gasholders, and which is not affected by sulphuretted hydrogen. They have also on view samples of their "Graphine" paint, which has a graphite base, and is used as a first coating on ironwork. There is also a metallic medium paint, having a base of oxide and red lead, and largely used for first coating on new steelwork. There are also some samples of the firm's "Pomona" cooker black, to dry with a glossy or dull surface. Seen, too, are samples of "Silverine" paint, having an aluminium base, largely used for decorative purposes, and samples of "Foochow" enamels for gas-engines. There are miniature lamp columns and lanterns, covered with quick-drying varnish paints; also gas-meters painted with glossy enamel paints, samples of various shapes and sizes of steel wire brushes, used to remove rust from ironwork, samples of a special make of tarred gaskin for torches, as well as jute spun yarn for mainlaying. An interesting feature of the exhibit is "Tamac" fire cement, which is shown in a fine powder as sent out; and it is also made up into cubes which have been fired to a heat of 3000° Fahr. This cement, when mixed with water to the consistency of putty, is ready for repairing retorts at full heat or cold, also, when reduced to the thickness of cream, it is largely used for washing or spraying (with a machine) retorts and other brickwork. Owing to its glazing property, greater immunity from carbon deposits is said to be obtained.

Metropolitan Gas-Meters Limited.

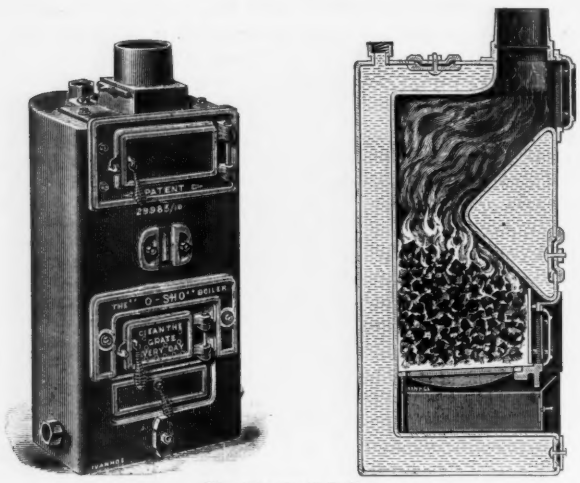
This Company have a three-light glass-cased prepayment meter on show. Likewise some controllers fitted in lamps made by Messrs. Parkinson and Cowan, Messrs. A. E. Podmore and Co., and Mr. W. Edgar. But just where these are placed, we do not at present know.

James Milne and Sons, Limited.

This firm have supplied a model of their station gas governor, as well as a high-pressure mercurial governor, high-pressure diaphragm governor, dry gas-meter, pressure recorders, and pressure-gauges.

"O-sho."

The "O-sho," by the same exhibitors, is an independent boiler, made in such sizes as are found suitable for small houses, villas, mansions, and large hotels, and is capable of giving a continuous supply of hot water in desired quantities. It replaces the kitchen boiler, and is easily connected to the existing circulating-pipes and cistern. The "O-sho" is also designed for burning gas coke. Cinders from coal-fires may be mixed with the coke; and practically all the kitchen refuse may be burnt in the fire without trouble or smell. Provision is made for cleaning out the sediment, which is left by such water as that supplied throughout London; each boiler having three to seven cleaning openings, according to size. The "O-sho" is made of Siemens steel and Staffordshire iron. The heating surfaces are so arranged that a very large proportion of heat from the fuel is passed into the water; consequently the cost per gallon is very low. A continuous supply of, say, 50 gallons of hot water per hour only means an



The "O-Sho" Boiler.

expense of about 2d. per day. The "O-sho" is made in 26 sizes. The smallest size gives 45 gallons per hour at 200°; the largest, 329 gallons. The removable ash-pan makes it a clean boiler for kitchen use.

PHŒNIX SUPPLY COMPANY.

This Company have supplied to the exhibition two hot water supply coke-boilers, which are known as the "Gasco," and are absolutely new. It is believed that these will fulfil the requirements of small houses for a useful boiler with gas coke as the fuel. The boiler is made in three sizes only—30 gallons of hot water (200°) per hour, 40 gallons, and 50 gallons. Provision is made for cleaning-out sediment; and a hopper is supplied for the storage of coke, so that the fire can be kept alight throughout the night. There is also an ash-pan for convenience in removing ashes. In addition to the design shown, the boiler may be made with a hot closet or plate-warmer on top, and an open front to show a bright fire in the kitchen; while when the front plate is let down, irons may be heated before the fire.

PNEUMATIC GAS LIGHTING COMPANY, LIMITED.

In several places in connection with the general description of the exhibition mention is made of the fact that the Pneumatic Gas Lighting Company, Limited, are fitting up their principal speciality at numerous points. We learn that they have had allocated to them something like 200 points which are controlled by their gas switches. These points are spread over the whole of the exhibition—the fittings being applied to domestic burners, high-power lamps, gas-signs, and gas-stoves. The lights on the gas-fire stand, for example, are partly fitted by the Pneumatic Company, as are also those in the shops in which bye-products are displayed. In the two shops of the Universal Light and Sign Company, Limited, the flash signs are fitted with the Pneumatic Company's system. In addition to the pneumatic distance gas-lighter, they are also displaying thirty of Neville's lift-off burners, some details of which appeared in our issue for June 24 last. The Company are also showing three of Neville's lift-off burners, very much simplified, for street and shop lighting—one, at least, is in the lamp lighting section. After long experimenting, the Company have been enabled to so construct them as to dispense with an air-regulating device, as the gas issuing from the injector into the open cup of the body automatically draws in the necessary quantity of air, thereby ensuring perfect combustion under varying gas pressures. Another prominent feature of the burners is the ease and convenience with which they can be lifted off for cleaning and other purposes. This burner has not as yet been generally seen, and so is sure to prove a great attraction at the exhibition.

"SPERSOM" PATENT DIAPHRAGM LIGHTING ARRANGEMENT.

Messrs. Ingram and Kemp, who are exhibiting various high-class artistic productions at the exhibition, regard as a special feature of greatest interest and importance to the gas industry the diaphragm distance lighting attachments, by which the fittings are lighted-up by means of a switch near the door, bed, or fireside, or elsewhere as desired. This lighting arrangement is the "Spersom" diaphragm patent. The particular feature of the device is that it is actuated by simple air pressure; there is no piston to stick; nor is there any battery or induction coil. Demonstration boards are provided at the exhibition, with a table lamp and a switch; so that the fixture will enable visitors to make actual demonstration of lighting-up. On the same board is a push actuating a section valve showing the internal working mechanism.

G. A. WILLIAMS.

Mr. G. A. Williams, of Foulden Works, Church Road, De Beauvoir Square, N., is supplying governors to work in conjunction with gas-fires at the exhibition.

JOHN E. WILLIAMS AND CO.

This exhibit consists of raw materials, &c.—viz., oxide of iron, oxide of zinc, lead ore in various forms, ochre, umber, &c., used in the making of the firm's anti-corrosive "Viternus" steel composition and other paints; gums as used in the making of varnishes for meter and lamp enamels; refractory materials employed in the making of their well-known "Fluxite" fire cement, and the gas plant cement for all gas-works joints; bitumen for making black enamel for gas cookers and stoves; "Klinka" for cleaning gas-cookers; aluminium for silver paint. There are also seen exhauster and machinery oils. A tinted photograph is observed of the 2½ million spiral gasholder at the Hollinwood station of the Oldham Corporation, together with various photographs and certificates. An interesting note may be made that the firm was established in 1862, and so attained its jubilee last year.

SULPHATE OF AMMONIA COMMITTEE CONFERENCE AT THE EXHIBITION.

THE Sulphate of Ammonia Committee have taken advantage of the Exhibition for holding an International Conference. There will be a large number of visitors to London at this time from among the producers, so that the event should be very successful in more ways than one.

Meetings of the Executive Committee will be held on Oct. 22; and the International meeting on the 23rd, at 10.30 a.m., in the Conference Room of No. 5 Hall at the Exhibition. Sir Corbet Woodall has promised to take the chair; and it is hoped that a very large number of sulphate of ammonia makers in the country will be there to welcome him and the representatives from the United States of America, Germany, France, and Belgium, who will give interesting information as to the propaganda work carried on in these countries.

A private dinner will be given on the evening of Oct. 22 to the foreign delegates.

DIARY OF EVENTS.

NATIONAL GAS CONGRESS AND EXHIBITION—October, 1913.

DAILY ATTRACTIONS.

STRING BAND OF THE SCOTS GUARDS, 3 to 4.30 and 6 to 7.30, IN THE DOMESTIC SECTION HALL.

MILITARY BAND, 8 to 9.45, IN THE DOMESTIC SECTION HALL.

MUSIC IN THE TEA ROOM, 4 to 5.

COOKERY LECTURE AND DEMONSTRATION AT 4 and 7.30 (EXCEPT 7.30 ON OCT. 31).

PRELIMINARY COOKERY COMPETITIONS OCT. 2 to OCT. 25 [INCLUSIVE] DAILY AT 2.30 and 6 (EXCEPT OCT. 8, 14, 22, and 23).

Wednesday, Oct. 1.

11 to 11.30 a.m.—**Reception by the President, Sir CORBET WOODALL.**

12 noon.—**Formal Opening by The Right Hon. The LORD MAYOR OF LONDON.**

1.15 p.m.—Luncheon to the Lord Mayor and other Patrons of the Congress and Exhibition.

2 p.m.—Exhibition Open to the Public.

Thursday, Oct. 2.

8.30 p.m.—POPULAR LECTURE: "The Evolution of Gas Lighting and Heating" (Part I.). By Professor Vivian B. Lewes.

Friday, Oct. 3.

Visit of the Southern District Association of Gas Engineers and Managers.

8 p.m.—POPULAR LECTURE: "The Silent Servant." By Miss Constance Williams.

Saturday, Oct. 4.

2 p.m.—**Conference on Food and Cookery.**

Papers to be read:—

"Cookery in its Relation to Health." By Joseph Priestley, Esq.

"Planning, Buying, and Cooking for the Working Man's Table." By C. Herman Senn, Esq.

"The Cookery Class in its Relation to the Home." By Miss Mildred Atkinson.

"The Penny-in-the-Slot Meter as the Working Man's Friend." By Mrs. Margaret M'Killop.

8 p.m.—POPULAR LECTURE: "The Evolution of Gas Lighting and Heating" (Part II.). By Professor Vivian B. Lewes.

Monday, Oct. 6.

8 p.m.—POPULAR LECTURE: "From the Coalfield to the Burner." By Henry O'Connor, Esq.

Tuesday, Oct. 7.

8 p.m.—POPULAR LECTURE: "The Evolution of Gas Lighting and Heating" (Part III.). By Professor Vivian B. Lewes.

Wednesday, Oct. 8.

Visit of the Midland Association of Gas Engineers and Managers.

8 p.m.—POPULAR LECTURE: "The Contents of a Lump of Coal." By Henry O'Connor, Esq.

Thursday, Oct. 9.

11 a.m.—**Conference on Coal Smoke Abatement.**

Papers to be read:—

"A Curse of Civilization." By Sir William Richmond.

"The Loss to Health and Pocket Caused by the Smoke Nuisance." By Sir William H. Bennett.

"The Gas Industry in Relation to Smoke Abatement." By Professor Vivian B. Lewes.

"What the Coal Smoke Abatement Society has done, and what it could do." By H. A. des Voeux, Esq.

8 p.m.—POPULAR LECTURE: "The Contents of a Lump of Coal." By Henry O'Connor, Esq.

Friday, Oct. 10.

Visit of the Eastern Counties Gas Managers' Association.

8 p.m.—POPULAR LECTURE: "From the Coalfield to the Burner." By Henry O'Connor, Esq.

Saturday, Oct. 11.

11 a.m.—**Conference of Educationists.**

Papers to be read:—

"Some Considerations on the Brightnesses of Lights." By Professor Sylvanus Thompson.

"The Physiological and Mental Disadvantages of Unscientific Illumination." By Leon Gaster, Esq.

"Cookery in the School." By Miss Mildred Atkinson.

"The School of the Future." By Septimus Warwick, Esq., and Austen Hall, Esq.

8 p.m.—POPULAR LECTURE: "Harnessing the Forces of Nature for the Service of Man." By Arthur J. Martin, Esq.

Monday, Oct. 13.

8 p.m.—POPULAR LECTURE: "The History of Fire Making. By Miller Christy, Esq.

Tuesday, Oct. 14.

11 a.m.—**Judging of Home Cookery Competitions.**

2 p.m.—**Conference on the Hygiene of Lighting and Heating.**

Papers to be read:—

"The Hygiene of Gas for Lighting." By Dr. Samuel Rideal.

"The Health Value of Radiant Heat." By Professor Leonard Hill.

"Modern Improvements in Gas Lighting and Heating Appliances." By Professor Vivian B. Lewes.

"Gas in its Relation to the Equipment of Hospitals and Sanatoria." By Dr. Hawkesley.

8 p.m.—POPULAR LECTURE: "The Evolution of Gas Lighting and Heating" (Part I.). By Professor Vivian B. Lewes.

Wednesday, Oct. 15.

Visit of the Wales and Monmouthshire District Institution of Gas Engineers and Managers.

8 p.m.—POPULAR LECTURE: "The Evolution of Gas Lighting and Heating" (Part II.). By Professor Vivian B. Lewes.

Thursday, Oct. 16.

PATRONS' DAY.

3 to 5 p.m.—**Reception (by Invitation only) by the PRESIDENT and LADY WOODALL.**

8 p.m.—POPULAR LECTURE: "The Gentlewoman in Her Kitchen." By Mlle. Claire de Pratz.

Friday, Oct. 17.

Visit of the Irish Association of Gas Managers.

11 a.m.—**Conference on Some Aspects of Scientific Illumination.**

Papers to be read:—

"The Aims and Objects of the Illuminating Engineering Society." By Leon Gaster, Esq.

"The Economy of Efficient Lighting." By Franklin Thorp, Esq.

"Light and Sight." By Meredith Young, Esq.

8 p.m.—POPULAR LECTURE: "The Evolution of Gas Lighting and Heating" (Part III.). By Professor Vivian B. Lewes.

Saturday, Oct. 18.

Combined Visit of Junior Associations. Mr. F. W. Goodenough Presiding at Tea.

8 p.m.—POPULAR LECTURE: "The French Hostess and her English Sister." By Mlle. Claire de Pratz.

Monday, Oct. 20.

8 p.m.—POPULAR LECTURE: "Construction, Operation, Testing, and Reading of a Gas-Meter." By W. H. Y. Webber, Esq.

Tuesday, Oct. 21.

Annual Meeting and Conference of the British Commercial Gas Association at the City Guildhall.

8 p.m.—POPULAR LECTURE: "Practical Hints on the Use of Gas in Factory and Workshop." By W. H. Y. Webber, Esq.

Wednesday, Oct. 22.

Annual Meeting and Conference of the British Commercial Gas Association at the Exhibition.

11 a.m.—**Judging of Home Cookery Competitions.**

Meeting of the Executive of the Sulphate of Ammonia Committee.

Private Dinner of the Sulphate of Ammonia Committee.

8 p.m.—POPULAR LECTURE: "The Origin and History of Artificial Lighting and Heating." By Edward Lovett, Esq.

Thursday, Oct. 23.

Imperial and International Day.

10.30 a.m.—**International Meeting of Sulphate of Ammonia Makers in the Conference Room of No. 5 Hall.**

11 a.m.—**Judging of Home Cookery Competitions.**

8 p.m.—POPULAR LECTURE: "Hints to Gas Consumers on How to Get Value for Money." By John Young, Esq.

Friday, Oct. 24.

2 p.m.—**Conference on the Economics of the Home (continued on Saturday, Oct. 25).**

Papers to be read:—

"Domestic Service as a Career for Educated Women." By Mrs. M. A. Cloudesley Brereton.

"Fuel and Light in the Working Man's Budget." By Mrs. Margaret M'Killop.

"Coal Gas as a Fuel for Domestic Purposes." By F. W. Goodenough, Esq.

"The Wife as Bursar." By Miss Mabel Atkinson.

8 p.m.—POPULAR LECTURE: "Hints to Gas Consumers on How to Get Value for Money." By John Young, Esq.

Saturday, Oct. 25.

11.30 a.m.—**Conference on the Economics of the Home (continued from Friday, Oct. 24).**

8 p.m.—POPULAR LECTURE: "A Pennyworth of Gas." By Dr. C. W. Saleeby.

Monday, Oct. 27.

11 a.m.—**Judging of Home Cookery Competitions.**

6 p.m.—**Final Cookery Competition for Housewives.**

8 p.m.—POPULAR LECTURE: "The Use and Abuse of Light." By Leon Gaster, Esq.

Tuesday, Oct. 28.

11 a.m.—**Conference of Employers.**

Papers to be read:—

"Co-Partnership as a Means of Increasing the Prosperity of both Capital and Labour." By Aneurin Williams, Esq.

"The Relation of Science and Industry." By Surgeon-General Sir Alfred Keogh.

"Co-Operation between the School and the Employer." By Cloudesley Brereton, Esq., L. ès L. Paris, and D. Milne Watson, Esq.

"Natural Law in the Commercial World." By A. F. Sheldon, Esq.

2.30 p.m.—**Final Cookery Competition for Territorials (A and B).**

6 p.m.—**Final Cookery Competition for School Children.**

8. p.m.—POPULAR LECTURE; "Practical Hints on the Use of Gas in Factory and Workshop." By W. H. Y. Webber, Esq.

Wednesday, Oct. 29.

11 a.m.—**Conference of Manufacturers.**

Papers to be read:—

"The Lighting, Heating, and Ventilation of Factories and Workshops." By Professor Vivian B. Lewes.

"Gas as a Fuel for Industrial Purposes." By Professor W. A. Bone.

"The Economic Value of Adequate Illumination." By Leon Gaster, Esq.

"The Matching of Colours by Artificial Light." By T. Thorne Baker, Esq.

"The Evolution of the Internal Combustion Engine." By Dugald Clerk, Esq.

2.30 p.m.—**Final Cookery Competitions for Boy Scouts, Girl Scouts, and Church Lads.**

6 p.m.—**Final Cookery Competitions for Sea Scouts and Territorial Nurses.**

8 p.m.—POPULAR LECTURE: "Practical Hints on the Use of Gas in Factory and Workshop." By W. H. Y. Webber, Esq.

Thursday, Oct. 30.

2.30 p.m.—**Final Cookery Competition for Cook-Generals.**

8 p.m.—POPULAR LECTURE: "The Silent Servant." By Miss Constance Williams.

Friday, Oct. 31.

6 p.m.—**Presentation of Prizes to Winners in Cookery Competitions by the Lady Mayoress of London.**

8 p.m.—POPULAR LECTURE: "A Pennyworth of Gas." By Dr. C. W. Saleeby.

Saturday, Nov. 1.

8 p.m.—POPULAR LECTURE: "Construction, Operation, Testing, and Reading of a Gas Meter." By W. H. Y. Webber, Esq.

NATIONAL GAS EXHIBITION.

LIST OF FIRMS SUBSCRIBING TO THE FUNDS, AND MOST OF WHOM HAVE CONTRIBUTED EXHIBITS.

IN the general notice of the Exhibition, we may have omitted some of the names of the firms who have contributed exhibits; and, therefore, in order to give all credit for what they have done, and are doing, we have pleasure in publishing a complete list of the firms of gas appliance and apparatus manufacturers who have subscribed to the funds.

ALDER AND MACKAY
ANGLO-FRENCH FIREPROOF SYNDICATE
ASHMORE, BENSON, PEASE, AND CO., LTD.
AVERY, J. H.
BALE AND CHURCH
BALFOUR, H., AND CO., LTD.
BILBIE, HOBSON, AND CO., LTD.
BLAKELEY, FIRTH, AND CO., LTD.
BLAND LIGHT SYNDICATE, LTD.
BRAY, GEO., AND CO., LTD.
BRITISH MANNESMANN TUBE COMPANY, LTD.
CANNON IRON FOUNDRIES, LTD.
CHEMICAL ENGINEERING COMPANY
CLAPHAM BROTHERS, LTD.
CLARK'S SYPHON STOVE CO.
CLAYTON, SON, AND CO., LTD.
COAN, R. W.
CROSSLEY BROTHERS
CURTIS'S AND HARVEY, LTD.
CUTLER, S., AND SONS, LTD.
DAVIS, BENNETT, AND CO.
DAVIS GAS STOVE COMPANY
DEMPSTER, R., AND SONS, LTD.
DEMPSTER, R. & J., LTD.
DERBYSHIRE SILICA FIREBRICK CO., LTD.
DONKIN, BRYAN, AND CO., LTD.
DRAKES, LTD.
EDGAR, WILLIAM
EWART, S., AND SON
FALK, STADELMANN, AND CO.
FLETCHER, RUSSELL, AND CO., LTD.
GAS METER COMPANY, LTD.
GIBBONS BROTHERS, LTD.
GIBBONS, B., JUNR., LTD.
GLENBOIG UNION FIRE-CLAY CO., LTD.
GLOVER, GEO., AND CO., LTD.
GLOVER, THOMAS, AND CO., LTD.
HALL, JOHN, AND CO.
HANDS, G., AND CO.
HARPER, JOHN, AND CO.
HEAD WRIGHTSON AND CO., LTD.
HELM LAMP COMPANY
HILL, ARDEN, AND CO.
HISLOP, R. & G.
HOLMES, W. C., AND CO., LTD.
HORSELEY COMPANY, LTD.
HUMPHREYS AND GLASGOW, LTD.
HUTCHINSON BROTHERS, LTD.
IMPERIAL STOVE COMPANY
INGRAM AND KEMP, LTD.
JENKINS W. J., AND CO., LTD.
KEITH, JAMES, AND BLACKMAN COMPANY, LTD.
KEMPTON, C. H., AND CO.
KIRKHAM, HULETT, AND CHANDLER, LTD.
LAIDLAW, R., AND SON, LTD.
LEAD WOOL COMPANY, LTD.
LEECH, GOODALL, AND CO.
LUMLEY, C., AND CO., LTD.
MACPHERSON, DONALD, AND CO., LTD.
MAIN, R. & A., LTD.
MANCHESTER PAINT AND VARNISH COMPANY, LTD.
MARSHALL ROBERTS, LTD.
METERS, LIMITED
METROPOLITAN GAS METERS, LTD.
MILNE, JAMES, AND SON
MITCHELL, H., AND THE "M. & M." COMPANY
MOBBERLEY AND BAYLEY
MOBBERLEY AND PERRY, LTD.
MODEL ENGINEERING COMPANY
NATIONAL GAS-ENGINE COMPANY
NEWTON, CHAMBERS, AND CO., LTD.
NEW INVERTED INCANDESCENT GAS LAMP COMPANY, LTD.
PARKINSON STOVE COMPANY, LTD.
PARKINSON AND W. & B. COWAN, LTD.
PEARSON, E. J. & J.
PHŒNIX SUPPLY COMPANY
PIGGOTT, THOMAS, AND CO., LTD.
PINCHBECK, LIMITED
PNEUMATIC GAS LIGHTING COMPANY, LTD.
PODMORE, A. E., AND CO.
POTTERTON, THOMAS
PREMIER GAS ENGINE COMPANY
RAMSAY SIGN COMPANY
RICHMOND GAS STOVE AND METER COMPANY, LTD.
ROTARY METER COMPANY (1905), LTD.
RUSSELL, JOHN, AND CO., LTD.
SMITH, J. & W. B.
SMITH, WILLIAM
SPENCER, WALTER, AND SONS
STEWARTS AND LLOYDS, LTD.
STOTT, JAMES, AND CO.
SUGDEN, F. C., AND CO.
SUGG, WM., AND CO., LTD.
TAYLOR, JOSEPH, AND CO.
TILLEY BROTHERS
TOWNSON AND MERCER, LTD.
UNIVERSAL LIGHT AND SIGN COMPANY, LTD.
VOELKER LIGHTING CORPORATION, LTD.
VULCAN STOVE COMPANY, LTD.
WALKER, C. & W., LTD.
WALLER, GEORGE, AND SON
WELSBACH LIGHT COMPANY, LTD.
WEST'S GAS IMPROVEMENT COMPANY, LTD.
WESTWOOD AND WRIGHT'S
WESSOE FOUNDRY COMPANY, LTD.
WILLEY AND CO., LTD.
WILLIAMS, G. A.
WILLIAMS, JOHN E., AND CO.
WILLIAMSON, CLIFF, LTD.
WILSON, GEORGE
WILSONS AND MATHIESONS
WINSTANLEY AND CO.
WOODALL-DUCKHAM VERTICAL RETORT AND OVEN CONSTRUCTION COMPANY, LTD.
WRIGHT, ALEXANDER, AND CO., LTD.
WRIGHT, JOHN, AND CO.

THE MODEL GAS LABORATORY AND PHOTOMETRIC ROOMS

At the National Gas Exhibition

WHILE the central idea of the National Congress and Exhibition at Shepherd's Bush is to inform the public as to the past progress and present place which the gas industry occupies in the home, in the town, and in the workshop, those responsible for its inception have not overlooked the fact that a very large number of visitors are also interested in another aspect of the industry—viz., its scientific side.

There has accordingly been installed in Gallery No. 4 a building, or rather a range of buildings, fitted up as a model laboratory, public testing-station, and photometry room, the work of equipping which has been entrusted to the firm which is under the direction of Messrs. Simmance and Abady—viz., Messrs. Alexander Wright and Co., Limited.

Just as the general execution of the central scheme of the exhibition is something of which the industry may well be proud, so we think that it may truly be said that these laboratories show to the world that, in soundness of method and thoroughness of detail, the gas profession in this country has nothing to reproach itself with.

The salient feature which calls for remark is that in the equipment of the laboratories there has been no striving after effect; but everything is planned on lines to which those familiar with a fair-sized gas-works in England are accustomed. This fact would render a description of the very complete equipment a matter of some difficulty; but it will be remembered that some years ago—when the idea of a central laboratory in connection with the Gas Institution was mooted, and more recently when the same idea recurred with reference to a proposed central building—Messrs. Simmance and Abady offered to present to the Institution a completely equipped laboratory. As we learn from these gentlemen that the present installation represents what they have in their minds in this connection, it will at once be seen that a description of it is of interest not only to the general reader but also to every member of the Institution of Gas Engineers.

In an exhibition of the present character—when "Trade Shows" are absent—the carrying out of the task entrusted to Messrs. Alexander Wright and Co. must have presented some difficulty; but we are bound to say that these difficulties have been entirely avoided, and what has been provided is a model laboratory on broad lines which will be equally interesting to the general public as well as to the cognoscenti of the gas industry.

The block plan fig. 1 shows the general arrangement by which three separate buildings adjoin and make the complete whole. The first section is devoted to lamp and burner testing; the second is fitted as a gas-testing station; while the third is a complete gas-works laboratory and testing-room.

The first section, which will no doubt prove very attractive to the man in the street—who wants to know how much light he can get from a pennyworth of gas—contains two photometers. The first is a long steel tube bar of the National Physical Laboratory type, but adapted for the rapid testing for street lighting and general illumination of high-power lamps. The characteristic feature is a new mirror device of Messrs. Simmance and Abady, over which the lamp to be tested is suspended. A movement of the mirror enables the light projected at different angles to be successively and rapidly presented to the photometer head, which is the well-known "Flicker" disc.

Lamps of very small candle power, and up to 10,000 candles, can be tested by this arrangement in a few minutes and with practically no calculation; and when we say "tested" we mean so that both the mean hemispherical intensities and the light at different angles are rapidly ascertained. The arrangement is shown diagramatically in fig. 2.

It will be understood that the light issuing from the third mirror does not obey the law of inverse squares, but is subject to the absorption of a definite percentage of the light emitted by the source to be tested. This being once determined, becomes the "factor" for the instrument, and can be checked in a few minutes (and as often as may be desired) by the person using the photometer. Provided the mirrors are kept clean, successive determinations of this "factor" show no deviation.

The balance or reading of the photometer head is obtained by moving along the photometer bar a standard of light of known candle power. This may be a flame standard or an electric standard; but the instrument (which will be at the service of the public during the exhibition) is equipped with a Simmance ten-candle pentane standard. This is constructed with a form of carburettor in which the air gas or pentanized air is made by air passing over a carburettor filled with broad wicks impregnated with pentane. In this way, the standard can be freely moved, because there is no pulsation of flame, such as occurs if the air passes over a carburettor containing a body of liquid pentane, which, of course, vibrates with the slightest movement.

It is intended to test during the exhibition, for the benefit of the public, lamps of any make; and, by the co-operation of the different lamp makers, an opportunity will be given to the general public to see the amount of light obtained from the different types and makes of lamps and burners of both high power and low power, and also to see the effect of the use of different shades, reflectors, and forms of glassware. Of course, the use of the mirror arrangement, which renders reading at different angles such a simple matter, naturally facilitates investigations of this nature.

The gas measuring side of the equipment consists of meters of various sizes, all with central dials, so that not only can the light

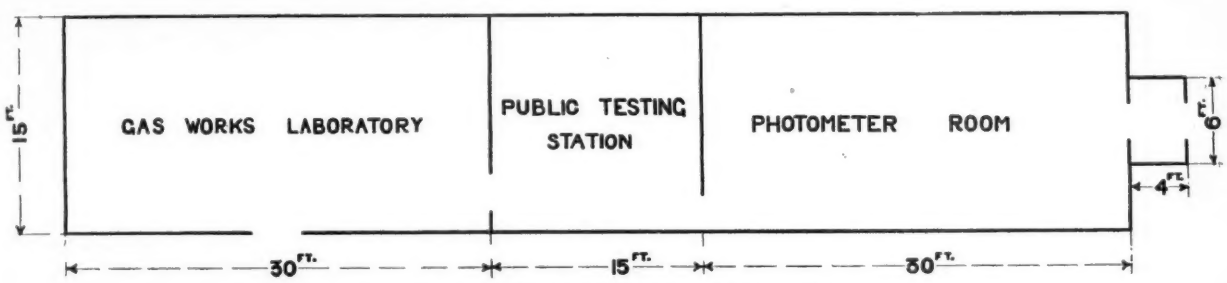


Fig. 1.—BLOCK PLAN OF THE LABORATORIES.

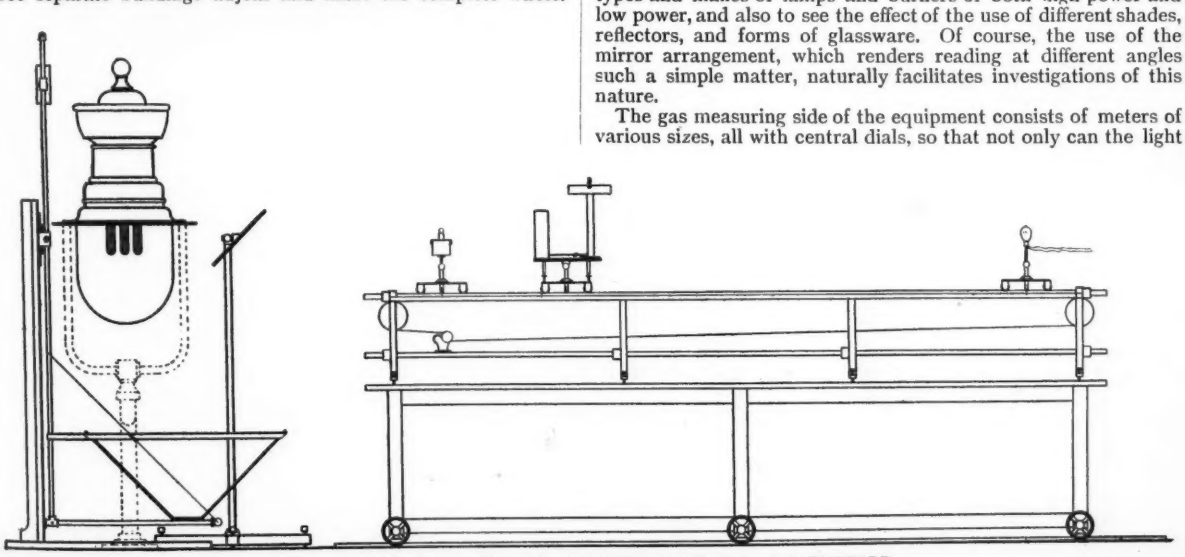


Fig. 2.—DIAGRAM OF MIRROR ARRANGEMENT FOR PHOTOMETER.

emitted be ascertained, but also the quantity of gas consumed, and thus the efficiency of any lamp stated in terms of duty per cubic foot.

There are also fitted pressure indicating and recording apparatus in the shape of Simmance-Abady "Dead-Beat" indicators and pressure recorders. It is hoped during the course of the exhibition that the high-pressure service not at present installed in Gallery No. 4 will be extended; and for this reason instruments suitable for indicating and recording high pressure are also fitted in the photometer room.

An alternative to the use of a moving flame standard is the employment of an electric standard; and as electric standards are now frequently employed in connection with street photometry, the photometer room is equipped with a second photometer bench, together with electrical instruments, so as to demonstrate how electric standards are standardized, maintained at a constant light, and utilized in connection with photometers.

A special form of electric metallic filament lamp is employed for use as a standard of light; and specimens of these are available in different sizes and therefore in different candle powers. These will no doubt prove of great interest to engineers who are concerned with problems of illumination.

In connection with the standardizing of electric standards, it is, as is known, necessary if a flame standard is used to correct the power of the ten-candle pentane standard according to National Physical Laboratory formulæ, so as to ascertain the corrected luminosity of the pentane flame for variations in atmospheric pressure and the hygroscopic condition of the air. The formulæ for these purposes have been gathered into a set of tables by Messrs. Simmance and Abady; and these are used in conjunction with a ventilating hygrometer also devised by them. Both the ventilating hygrometer and the correction tables are, therefore, installed in the photometer room.

The second section of the laboratory is fitted as a public testing station; and in it are installed two model photometers. One is the type used under the Gas-Works Clauses Act with the No. 2 "Metropolitan" burner and with the usual equipment employed in provincial gas-works. The other is a "Table" photometer, such as is used in London and one or two towns outside. Tests will be made on the illuminating power of the gas supplied to the exhibition; and an operator is to be in attendance during the whole of the exhibition to explain to any member of the public how the quality of the gas supplied is subject to continual checking by the public authorities.

Looked at from this point of view, we think it will be rather interesting for the general consumer to know how the quality of the gas supplied to him is constantly and independently checked by local authorities; and we are inclined to think there are very few industries which are subject to such continual checking, and have emerged from it with so few lapses, as has the gas supply of this country.

The third section, which consists of the model gas-works laboratory and testing-room, is a building (30 feet long and 15 feet wide) fitted with benches, sinks, water supply, and gas connections, &c. —all in a manner surprisingly permanent when it is considered that the building is put up merely as a model and for the temporary period of one month.

The simpler and more usual forms of chemical apparatus are not left about haphazard, but are arranged into sets of apparatus for the complete examination of certain of the properties of raw materials, bye-products, &c., which are usually associated with the manufacturing processes that take place in a gas-works. They are also arranged in systematic order; and although many of the sets must, of course, be familiar to practised gas-works chemists, this careful and systematic arrangement will no doubt appeal to the many students and scholars who will be visiting the exhibition.

The order in which this general chemical apparatus is arranged is as follows:—

Coal Testing.—Apparatus for ascertaining calorific value. Apparatus for ascertaining percentage of nitrogen. Apparatus for ascertaining percentage of carbon and hydrogen. Apparatus for ascertaining percentage of sulphur. Apparatus for ascertaining percentage of volatile matter and moisture. Apparatus for determining the value of the coal for gas-making purposes and for giving an idea of the bye-products likely to be obtained.

Petroleum.—Apparatus for ascertaining the contents of moisture; solid residue; specific gravity; distillation test; flash point; viscosity.

Crude Coal Gas.—Apparatus for ascertaining the amount of sulphur. Rapid tests for carbon dioxide, carbon monoxide, ammonia, and sulphuretted hydrogen. Referees standard tests.

Finished and Crude Gas.—Instruments for effecting the complete analysis at constant pressure and at constant volume. Apparatus for ascertaining the inflammable gases. Apparatus for ascertaining the absorbable gases. Apparatus for ascertaining the naphthalene. Rapid tests for carbon monoxide. Carbon monoxide recorder.

Gas Liquor and Ammonium Sulphate.—Distillation sets; spent oxide test for the amount of sulphur. Fouling test apparatus for ascertaining the value.

Lime.—Calcimeter for calcium carbonate.

Tar.—Distillation set. Anthracene test.

Water.—Apparatus for ascertaining the hardness; total dissolved solids; alkalinity.

Retort-Setting and Boiler Furnace Control.—Instruments for facilitating the regulation of the heat to retort-settings and boiler-flues by means of careful observations of the draught and the percentage of CO_2, so as to obtain efficient combustion and economizing fuel, are also fitted in the laboratory. Fig. 3 is an illustration of the Simmance-Abady "Valveless CO_2 Recorder." Fig. 4 is a draught gauge. A special form of this very open scale indicator (with combined pressure and vacuum scale) is also shown, as being opportune for the regulation of the foul-mains in connection with vertical retorts.

Another special instrument connected with the economical management of carbonizing plant is the Carr-Nairne jet photometer, which is adapted for use on foul gas, and the principles of which have already been explained in these columns.

For ascertaining several of the physical characteristics of gas, the laboratory is equipped with several instruments without a description of which this record would be incomplete.

With calorific power playing such an important part at the present moment, it was to be expected that the model laboratory would be very strong in this respect; and the expectation is justified by the presence of the well-known Simmance-Abady calorimeter, the instrument which Messrs. Simmance and Abady have more recently produced—*i.e.*, the total heat calorimeter, the Boys' calorimeter (which is used in the London testing-stations), and the Simmance-Abady "Calor-graph" or recording calorimeter.

It will be gathered from fig. 5, and from the descriptions of the total heat calorimeter which have recently appeared in the columns of the "JOURNAL," that this instrument is designed to ensure a perfect balance between the inlet water, the inlet air, and the outlet products temperatures, and also to prevent low readings of gross calorific power which always occur in an ordinary calorimeter—particularly if the air is dry, and the temperature of the room at

Fig. 3.—Simmance and Abady's CO_2 Recorder.

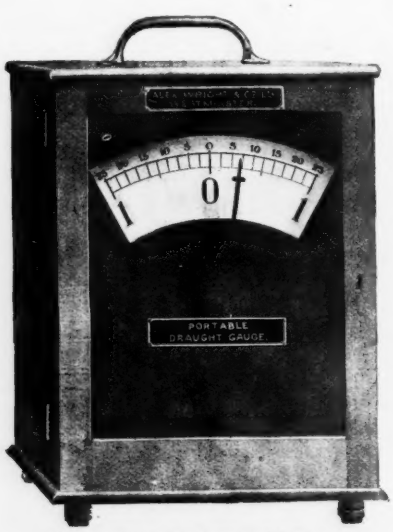


Fig. 4.—Open-Scale Draught-Gauge.

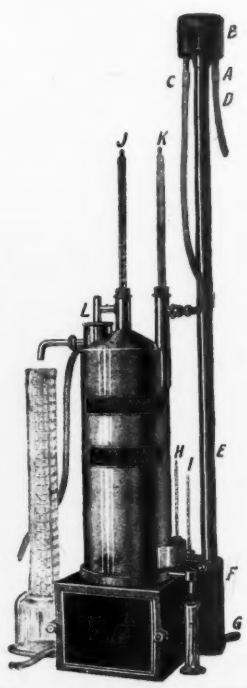


Fig. 5.—Total Heat Calorimeter.

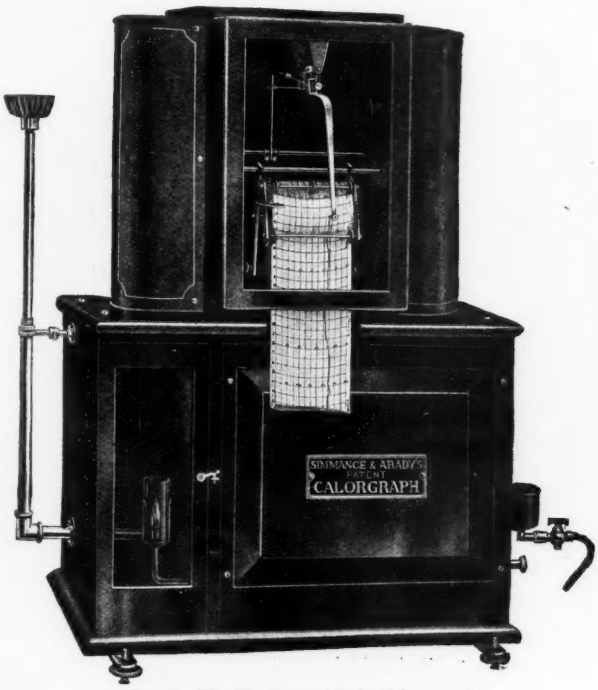


Fig. 6.—The Simmance-Abady Calor-graph.

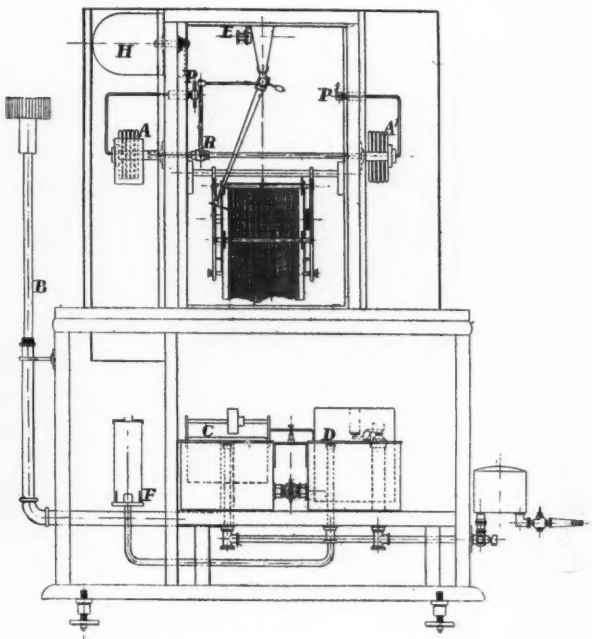


Fig. 7.—Diagram of the Simmance-Abady Calor-graph.

all above normal. Engineers will no doubt welcome the opportunity of inspecting this interesting calorimeter.

The recording instrument is also shown in its latest form; and, as will be seen from fig. 6, it is fitted with an additional improvement in the shape of a tape-chart, which records for sixty days on a continuous roll. The diagram fig. 7 shows the very simple nature of the construction of the "Calor-graph," to which previous reference has been made in our pages.

A greatly simplified, but at the same time improved, form of Simmance-Abady gravitometer (which automatically indicates or

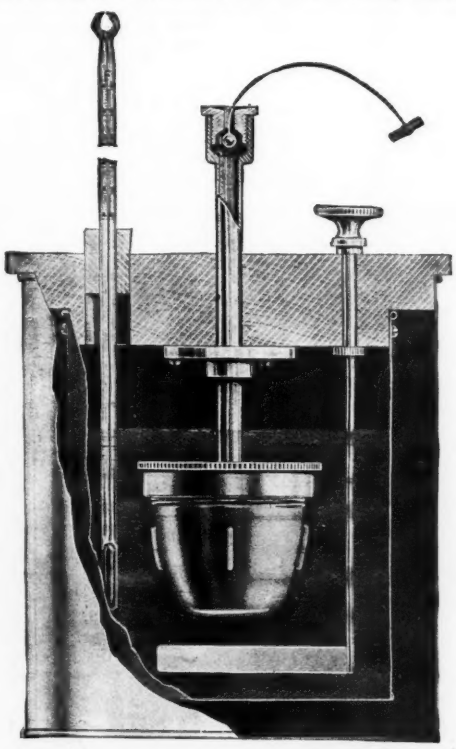


Fig. 8.—The Roland-Wild Calorimeter.

records changes of the gravity of the gas) is perhaps the most novel feature in the laboratory—even to those who keep themselves up to date with the rapid development of testing instruments. The gravitometer is fitted in a taller case than previously. The diameter of the bell and the suspension of it are both altered—the former being increased and the latter being simplified—while the scale is made of a total length of 13 inches, and only graduated between 0·35 and 0·65.

The effect of this construction is that, on a very open scale, the instrument is divided to the third decimal place, and thus the difference between the lines indicating (say) 0·455 and 0·456 is 1 millimetre, while the difference between the lines indicating 0·45 and 0·46 is as much as 10 millimetres. This very open scale thus enables the slightest change in the gravity to be easily read. The scale is, in fact, ten times as open as that with which gravitometers which have been previously made have been fitted; and, with the present instrument, it is quite easy to estimate to the fourth place of decimals.

It will be convenient to conclude this account of a very complete laboratory by specially mentioning a few of the more interesting items included in the above summary.

The calorimeter for testing the heating power of coal is a Roland-Wild calorimeter, which effects combustion by means of mixing the coal with sodium peroxide. The instrument is direct reading, and is shown in fig. 8. We believe it is used to a very great extent by collieries and owners of power plants.

The "CO" recorder is a modification of the Simmance-Abady automatic gas analyzers using the iodine pentoxide reaction due to Dr. Leonard Levy (see fig. 9); while the same reaction is also employed in the rapid laboratory or works test for carbon monoxide, which is also due to Dr. Leonard Levy, and is shown in fig. 10.

It will be gathered from the above description that the laboratory is strong in gas analysis apparatus, and illustrations figs. 11 and 12 are appended of Dr. Leonard Levy's constant pressure and constant volume apparatus—described in the "JOURNAL" for May 13 and 20 last, and utilizing the silica platinum capillary tube.

Fig. 13 is a form of Orsat apparatus which, perhaps, is not as widely known as it might be, and is an efficient alternative to the usual form—being fitted into a neat metal case and useful for rapid analyses of producer gas and the like.

An interesting form of new gas analysis apparatus devised by Mr. J. G. Taplay is also in operation. Those of our readers who are interested in gas analysis will recollect the series of articles by Mr. Taplay, on his combustion analyzer, which appeared in these columns on April 23 and 30 last year, and which centred round an apparatus designed by him, in which the combustion of residual gas was effected by means of copper oxide in a silica tube heated by a bunsen burner.

It will be remembered that, in this form, it was necessary to use an inert gas to sweep out the gas-ways after combustion was effected. The new form which is installed in the model laboratory is an improvement upon the above, inasmuch as the combustion takes place by means of a silica tube heated similarly by a bunsen burner, but containing not granular copper oxide but a stick of solid oxidizing material in the form of a rod supported in the centre of the tube on silica loops. This rod, when heated, effects the oxidation (combustion) of the combustible gas, and does not require the employment of any inert gas to sweep out the products of combustion—this being done in the usual way by means of the containing fluid (mercury).

The simplification which this brings about will be evident to all concerned in gas analysis apparatus, and who view this interesting departure. [Incidentally it may be here remarked that Mr. Taplay is, we are glad to learn, writing another article on this.] It is of further interest in that it enables the carbon and hydrogen densities of different fractions of light oil and spirit to be carried out; and in view of the development in the gas industry which is taking place in the direction of the production of motor spirit,

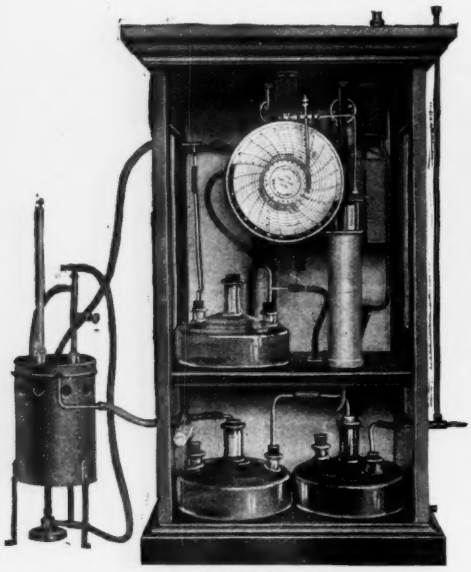


Fig. 9.—The CO Recorder.

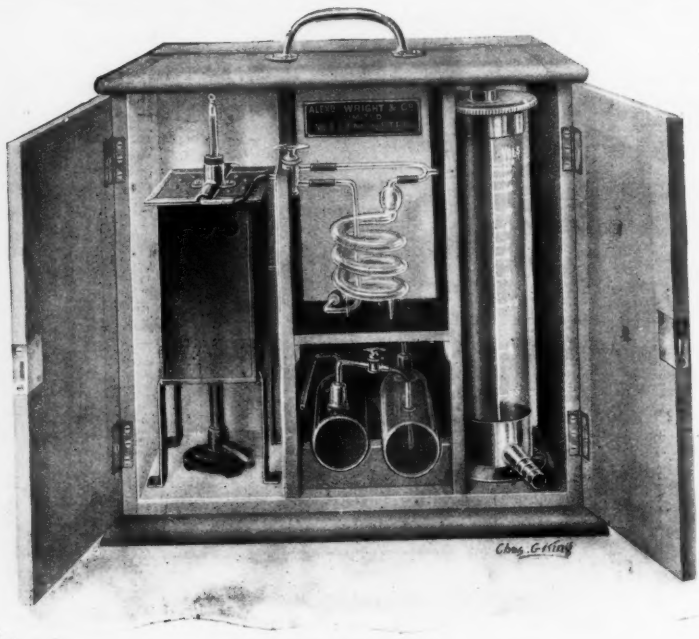


Fig. 10.—The CO Indicator.

Taplay's new combustion analyzer will, no doubt, be of considerable value.

Finally, it should be stated that a suggestion as to an economical method of heating water required for a laboratory is made in the shape of a new form of water-heater devised by Messrs. Carr and Nairne, which we are informed has an efficiency approaching 100 per cent. on the gross calorific power of the gas. The construction of this circulating water-heater is exceedingly simple.

We trust that this lengthy—and yet, withal, very condensed—summary of the model gas laboratories at the exhibition will form a useful guide to those who are interested in this particular branch of gas manufacture.

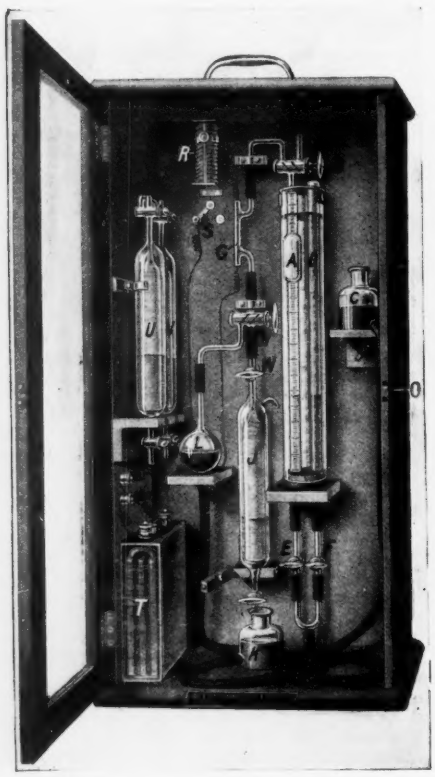


Fig. 11.—Dr. Leonard Levy's Constant Pressure Gas Analysis Apparatus.

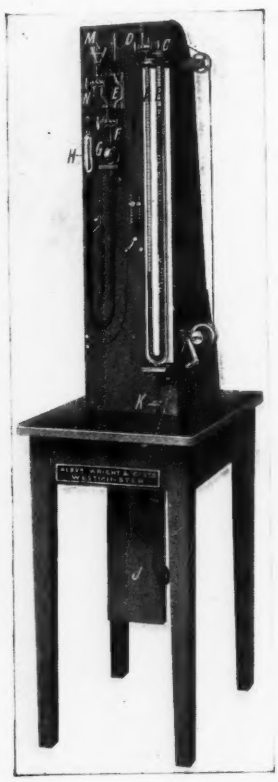


Fig. 12.—Dr. Leonard Levy's Constant Volume Gas Analysis Apparatus.

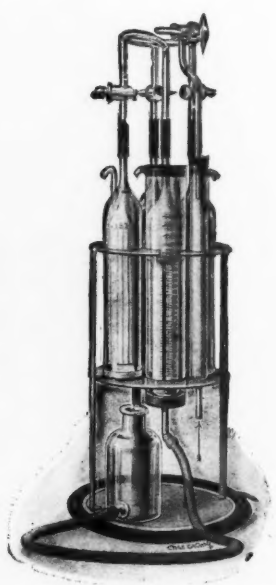


Fig. 13.—Orsat Gas Analysis Apparatus.

Eastern Counties Gas Managers' Association.—As already briefly announced in the "JOURNAL," the next general meeting (the fiftieth) of this Association will be held at the National Gas Congress and Exhibition on Friday, the 10th prox. According to the programme issued by the Hon. Secretary and Treasurer (Mr. Joseph Davis, of Gravesend), the business will comprise the election of four new members and an associate, the induction of the new President (Mr. T. Goulden, Chief Engineer of the Gaslight and Coke Company), and the fixing of the date and place for the spring meeting next year. By the kind invitation of the Governor (Sir Corbet Woodall, D.Sc.) and Directors of the Gaslight and Coke Company, luncheon will be provided in the exhibition buildings. After the meeting, the members will make a tour of the exhibition, and in the evening will dine together. The whole of the next day will be devoted to the exhibition and its surroundings.

ELECTRICITY SUPPLY MEMORANDA.

The Advent of "Electra House."

At one point on the borders of the great Metropolis is Catford—a district that, though adjacent to one of the busiest and most populous parts of south-eastern London, was largely meadow land not so many years since, and threaded by lanes, lined by hedges and trees. The demands for modern dwellings, the increasing population, the restless migratory tendency, all combined to cause the builder to lay a heavy hand upon Catford. New streets were formed, houses were reared, and the district developed into a residential one in a space of time that suggested the free use of the magician's wand. The South Metropolitan Gas Company saw their opportunity. A new district, and new houses by the hundred—there was the opening for cultivating to the fullest extent the use of modern gas methods for lighting, heating, cooking, water-heating, and all the other instruments to labour-saving that gas—through its reliable supply and reliable appliances, moderate in first cost and subsequent maintenance—can provide. In their enterprise and in the furtherance of their commercial object, the Gas Company became the occupiers of one of the new houses on the main road, and fitted it up with gas as a house should be fitted. This "Model Gas House" was described in our columns during 1909. It attracted people; and its educational influence and its commercial success have been of the highest importance to, on the one hand, the residents in the district, and, on the other, to the Gas Company. But there were the electrical competitors. The Gas Company's enterprise could not be hidden from their view. So it came to pass that the South Metropolitan Electric Supply Company determined to copy their opponents. "Imitation is the sincerest form of flattery." Of the house adjoining the gas-demonstrating one, the Electric Supply Company became the tenants; and "Electra House" sprang into being, to compete with the model gas-equipped house. From the distance, there reach our ears to-day the decadent notes of the songs of praise and triumph of the Electrical Press. "Electra House" was hardly equipped, and started on its intended proselyting journey, before one paper spoke of the "10,000 callers!" "It is difficult," said the paper, "to exaggerate the good work which model electric houses can do in their respective districts, more particularly if the house is actually occupied, and the show-room idea is kept religiously in the background. If the local gas concerns start rival establishments, so much the better for the electricity undertakings; for visitors to both cannot fail to be struck by the difference in atmospheric conditions, the state of the decorations, ceiling and paint work, the cleanliness of the equipment and utensils. . . . Electricity has nothing to fear from such competition, which tends to emphasize the defects of gas in the house rather than its merits."

The Exit and Conversion of "Electra" House.

That was written in September, 1910; and September, 1913, sees the conversion of "Electra House," and the conveniences, reliability, and economies of gas installed therein. Several months ago, the Electric Supply Company closed "Electra House," and gave up the tenancy, which is the best of possible proofs that, despite all the high-flown writings in the Electrical Press of 1910, its mission had failed, and that the Company found that its cost brought an insufficient return to justify its continuance. But that is only one side of the story. "Electra House" was equipped in model style. It may be safely assumed that nothing was left undone to ensure electrical perfection in the house; and its equipment was always under the eye of the electrical expert. The wiring was the best of its kind; the fittings, the choicest compatible with position; the upkeep, unimpeachable. When the Electricity Supply Company finally locked the doors against the outside public, whose neglect made "Electra House" a white elephant, they left the equipment there, apparently in the hope that a new tenant would take it over. But "Electra House" has failed to convince the successor in the tenancy of the Electric Supply Company. With all the electrical equipment in it, the house has only recently been re-let; but the new tenant will have none of it. "Electra," the over-rated for domestic purposes, has failed to convince him. The very establishment set up for the purpose of converting to electricity the residents upon the new Catford estates has gone over to a gas equipment. The failure of the electric equipment is an ignominious one—for electricity. The South Metropolitan Gas Company have, on the new tenant's instructions, removed the wiring through which flowed the energy that was intended to educate and convert, and to demonstrate, by comparison with the Model Gas House next door, the so-called "defects" of gas. The electrical equipment has gone. The house has been piped for gas, the gas-fittings have been selected for the house, good quality illumination without injury to eyesight, and certainty in service for this and other domestic uses, have been established, together with economy. The hopes of 1910 have in three short years faded and ultimately disappeared. The electrical pæans of 1910 have gradually changed into an electrical dirge. "Electra House" has been added to the colossal mountain of mundane failures. R.I.P.

La Maison Electrique.

There is a sudden outburst of fervour on the part of our electrical friends in London. In statements that have appeared in the Electrical Press, the foundation of which statements was prepared by one and the same pen, we are in effect told that the gas industry is not, during October, to have the Metropolis all to itself in the National Gas Exhibition, and that the Ideal Home Exhibition (which will be opened at Olympia Oct. 9 to 25) will afford "an opportunity for providing an antidote to the impression the gas companies will seek to create." Very good. We are not frightened. On the contrary, we rather welcome this hasty display of zeal on the part of the London Electricity Companies, who have given the Electricity Supply Publicity Committee this opportunity for shaking off the lethargy that has enshrouded them for some time past. The exhibit that has been arranged for the Ideal Home Exhibition is to take the form of an electrically equipped house, to be known as La Maison Electrique. Comparison of this house with what is to be seen at the National Gas Exhibition will be highly serviceable to the latter. Economy, utility, and efficiency will face the visitor everywhere at the Gas Exhibition; the impression of luxury will be carried away by the visitors to La Maison Electrique. This will just suit the book of the gas industry. The masses will see at a glance that the latter place is not for them. The necessity for presenting a visiting-card, and signing their names in the visitors' book, will debar inspection by most ordinary folk, the great majority of whom do not habitually carry visiting-cards. Gas engineers who are coming to London during October will take the hint, and not leave home without a visiting-card, in case they can squeeze in time to run along to the Ideal Home Exhibition.

Novelty and Luxury.

The public, we fancy, will look upon the exhibit as a novelty display. Visitors will see a house, in old English style, with a garden forecourt, in which will be an ornamental fountain, illuminated by coloured electric lamps. There are not many forecourts of houses occupied by the ordinary man with illuminated fountains in them. The house will comprise a dining-room, a pantry, a kitchen, a private office and store, a model business office, dressing and bath rooms, and a bedroom. The dining-table will be arranged to demonstrate the feasibility of a dinner being served without the intervention of servants. Indirect and semi-indirect lighting will be prominent; these systems being in the case of electricity a necessity, and in the case of gas simply a provision to comply with taste. Radiators, cookers, ventilators, electric irons, vacuum cleaners, &c., will all be there. Some thirty attendants will be on view; and 100,000 copies of a 30-page booklet have been prepared for distribution, giving information and argument in favour of electricity in the domestic service. To advertise the display, 4000 posters are being printed for the hoardings of London. It cannot be helped; but the fact remains that the electrical people will not have the Ideal Home Exhibition all to themselves. Through the enterprise of the South Metropolitan Gas Company, last year an excellent display was made there of domestic gas lighting and equipment; the same Company will be at the Ideal Home Exhibition again this year. There will also be a display of gas water-heating boilers for the home, and probably other gas appliances.

When Other Eyes.

Naturally the eyes of the electricity industry will be kept sharply and critically on the National Gas Exhibition; and we think it a very safe thing to presage that not a few electrical people will assist to make the turnstiles swing to see what the gas people have done in the way of a co-operative display for the attraction of the public. They will find not only one Maison du Gaz, but several; and much else that will be, we anticipate, very popular. "Meteor" of the "Electrical Times" is graceful in his reference to the co-operative display; and as there is so often occasion to remonstrate with him over his inaccuracies concerning gas, we quote his remarks as being in the nature of a little amend for his customary attitude:

> We await with some curiosity the opening of the National Gas Exhibition at the White City. For our friends the enemy agree with us as to the value and the need for a collective exhibit as the widest and most effective appeal to the public. They have sunk their claims to act each according as he thinks best in the space allotted to him; individualism for once gives way to combination. The gas industry has set itself to show the public all that gas can do in the way of lighting, heating, cooking, power, and so on. The whole resources and capabilities of gas as a servant of the community are to be set forth and demonstrated to the best advantage; and we have little doubt that neither time, money, nor brains will be spared on the enterprise. The fundamental idea is undoubtedly right, the working out of it will probably be right also. *Fas est et ab hoste doceri.* No doubt we electrical people shall be able to gain many useful hints from this demonstration by the massed forces of our competitors; and when the time comes for the next big electrical exhibition (according to the triennial formula, it is due twelve months hence), it will be our own fault if, with the immeasurably greater range and multifariousness of our staple, we do not electrify the public.

The electrical industry has never got over the Olympian mistake of 1911; and it is to the scene of this disappointment that they are now taking La Maison Electrique. It may be expected that ere long we shall be hearing whether or not next year will

see an electrical exhibition on a large scale. If we do, the gas industry must not be surprised to learn that the electrical industry will propose to depart from the manufacturers' compartment form of exhibition, and emulate the gas industry in a co-operative display, and so endeavour to turn the last public failure into this time a public success. Another electrical paper referring to the "enterprise" of the gas industry remarks that "possibly there is a good deal of mutual jealousy and disappointment among the manufacturers, who are taking part in the co-operative exhibit." There was a little feeling that the plan obscured the manufacturer and his individual work. But this was far from the general view. It may be said to-day that what little feeling existed in this way has gradually vaporized, and finally disappeared. The old idea of the individual stand, the prominent display of names, and the opportunity for booking orders were traditions that in some quarters were hard to kill. Now, however, it is recognized that the present scheme is one for appealing directly and solely to the public in a convincing way. For, after all, the public is the source of demand upon the principal customers of the manufacturers, to which customers the manufacturers have other channels of appeal than by way of an exhibition. The dealings of the gas-supply industry with the manufacturers are measured by the dealings of the public with the former.

Higher Intensity Illumination.

There is not complete agreement in the electrical industry with the views expressed by Mr. Sowter, as noticed last week, upon the question of the effect of the possible introduction of a half-watt-hour-per-candle electric lamp. His idea is that those consumers whose custom is hardly worth having now will be to electric undertakings a positive loss with lamps in use only consuming one-half or one-third the energy that the present metallic filament lamps require. In one letter that has appeared in the "Electrical Times," there is acknowledgment of the life that exists in the gas industry, the early demise of which was long ago predicted by some foolish electrical persons, and by a strange and occasionally hysterical contemporary, the industry was represented as fighting in the last ditch. But the gas industry lives, accumulating substance and strength year by year. Now the letter before us says that the electricity supply industry cannot afford to allow anything in the way of electrical progress to go begging. "To compete successfully with high-pressure gas, we want the very highest efficiency we can get." The writer is of opinion that the half-watt lamp is not arriving a moment too soon, more particularly as regards factory and mill lighting. This writer and another one consider that the new lamp will cause consumers to go in for a higher intensity of illumination, and that this will tend to counterbalance the direct consumption effect of the higher efficiency lamps. It is rather an intangible sort of foundation for hope, and too much reliance must not be placed upon it. There is nothing more difficult than to get people out of their old ways. A tradesman is tempted to higher levels of illumination by the advertisement it gives him; but the domestic consumer has not the same incentive. What is really prospectively a disadvantage is that he has been drilled by the electrical people, and by his accounts, into exercising rigid economy in the use of light, until externally the habitations of many users of electricity for lighting are dismal looking places. The private user of electricity will not be so easily weaned from the economizing habit that has been encouraged (for politic reasons) as some people fondly hope and imagine. The facility for switching-off the light certainly has its disadvantages when half-watt lamps come along.

DEATH OF MR. GEORGE WALLER.

Octogenarian Engineer Dies on the Anniversary of his Birth and Marriage.

WE much regret to announce the death of Mr. George Waller, of Phœnix House, Thrupp, Stroud, Gloucestershire, which occurred at his residence, on Friday afternoon, the anniversary of his birth and marriage.

The deceased gentleman, who was 81 years of age, was the head of the firm of Messrs. George Waller and Sons, engineers, of the Phœnix Iron-Works, Thrupp. The business was established by Mr. Waller's uncles in London, over a century ago, and was removed to the Stroud Valley to the present site in 1887. Mr. Waller's forte was the foundation of plant for the manufacture of gas; and the firm are among the most eminent in this line at the present time—their apparatus being distributed in all parts of the inhabited globe. The staple industry of the firm was founded by the late Mr. George Waller 25 years ago, and has never been equalled, much less surpassed, for the particular purpose for which it is used.

On Sept. 26, 1860, at Dartford Parish Church, Mr. Waller was married to a daughter of Mr. William Braund, of Dartford, and in 1910 the venerable couple celebrated their Golden Wedding. The happiest relations have always existed between the firm and their 200 old employees, and the event was marked by a great gathering of the workpeople, at which presentations were made to Mr. and Mrs. Waller. These consisted of a silver rose-bowl, a brooch set with diamonds, and a gold-mounted malacca cane. Mr. Waller was a staunch Conservative and loyal Churchman; and he and his family did much useful work in connection with the church at the Thrupp. In every good and progressive movement Mr. Waller took a leading part. He was one of the founders of the Brimscombe Polytechnic, near Stroud, and throughout its career he proved one of its strongest and most generous supporters. He had great faith in the institution, and with much readiness accepted lads in his works who had been trained there. Many a boy, with elementary school education polished up at the Polytechnic, owes his advancement in the world to the late Mr. Waller's kindly interest.

He will be much missed, and great sympathy is felt for the widow and children—three sons (including Mr. B. B. Waller, who has been the active head of the Phœnix Iron-Works in recent years (and three daughters—in their loss of a devoted husband and father, whose illness has extended over a very considerable period.

PERSONAL.

Mr. J. W. BROWN (who, it may be remembered, during the absence of Mr. W. Arnott, the Manager at the Cape of the South African Lighting Association, took charge of the works) has been appointed Manager of the Bridgetown Gas-Works, Barbados (West Indies), in succession to Mr. Willoughby. Mr. Brown has already left England for his new post.

We regretted to learn last week that, owing to continued ill-health, Mr. C. W. BLAND had (much to the regret of the Board) found it necessary to resign his position as Managing-Director of the Bland Light Syndicate, Limited. Mr. F. J. GOULD, who has for some considerable time acted as Manager, and who has been well known in the gas industry for over thirty years, has been appointed to succeed Mr. Bland.

Mr. H. C. E. GRIPTON, assistant at the Windsor Royal Gas-Works, has gained at the examination in "Gas Engineering" (1) the silver medal given by the City and Guilds of London, (2) the three guineas presented by the Goldsmiths' Company, (3) the silver medal awarded by the Polytechnic, and (4) the three guineas given by the Society of British Gas Industries. These several awards have, it is stated, never before been won by the same man.

Mr. C. H. CARDER, the Assistant to the Engineer of the Cardiff Gaslight and Coke Company, has been appointed Assistant Engineer and Manager to the Bath Gaslight and Coke Company. A Public School man, Mr. Carder served his articles to Mr. S. O. Stephenson, at Tipton, and was for two years afterwards Assistant there. He was also associated with the South Staffordshire Mond Gas Company during the construction and testing of their works, before being appointed to Cardiff seven years ago. Mr. Carder has had very wide experience of constructional and administrative work, and has been intimately connected with technical research, for which he may be regarded as being particularly well qualified.

OBITUARY.

The death took place last week, at Otley, of Mr. JOHN EDWARD LOWREY, who was for 26 years Secretary of the Otley Gas Company. Mr. Lowrey, who was originally an accountant, was 74 years of age, and a native of Leeds. He leaves a widow and three daughters.

Mr. ROBERT EMERY WALKER, ex-Provost of Dunfermline, passed away on Thursday last. Mr. Walker was Provost when it was decided to acquire the gas-works; and it was principally through his exertions that the transaction was carried through, at a cost of nearly £100,000. There was much opposition at the time, both in and out of the Town Council, which was attributed to the fear that the days of gas were numbered. Now the ratepayers of Dunfermline are very thankful for the foresight of Provost Walker and those acting with him, as the gas-works are recognized as a valuable asset to the community. Curiously enough, Mr. Walker was also a prime mover in bringing the Fife Electric Power Company into the burgh; and the apparent inconsistency has frequently been remarked upon. After buying up the Gas Company, to set up a Company for power and light does seem peculiar; but it was for the introduction of electric tramways that Mr. Walker advised the installation of electricity.

In the "Comptes Rendus" for the 15th inst., MM. Taffanel and Le Floch deal with the subject of gaseous mixtures and temperatures of inflammation. The combustible mixture is introduced suddenly into a vessel, the walls of which are at a known temperature; the combustion being shown by a self-recording pressure-gauge. Results are given for mixtures of air with methane, hydrogen, carbon monoxide, acetylene, ethylene, pentane, and finely-divided oil.

ANALYSIS OF CLAYS, SILICATES, &c.

Dr. Mellor, the author of an important treatise on analytical chemistry, is well known to gas engineers as the Technical Adviser to the Refractory Materials Committee of the Institution of Gas Engineers. To analytical chemists, he has long been known as the principal English authority upon the subject of clay analysis and clay testing. The volume before us,* which forms the first of a two-volume treatise on the Ceramic Industries, will, therefore, at once command attention; and we do not think that it will fail to evoke commendation from all who are qualified to criticize it. Volume II. will deal with the testing of clays and clay products by methods not analytical.

The processes described in Dr. Mellor's book for the analysis of clays, bricks, enamels, and colouring matters are those in use in the Testing Department of the County Pottery Laboratory of Staffordshire, and for the most part have the merit of having been practised for a long period by a considerable number of workers. Consequently, they may be accepted with confidence as reliable and of practical utility.

Although the volume is essentially a book for the pottery laboratory, its appearance under the title "A Treatise on Quantitative Inorganic Analysis" is not too pretentious; for it conveys voluminous instruction in the general methods of quantitative analysis, and describes in detail processes by which most of the common inorganic articles of commerce may be quantitatively analyzed.

Chapters I. and II., which deal with weighing and the measurement of volumes, contain a lot of information which is already common knowledge to all chemists who have passed through the usual course of school instruction. We are not sure that these chapters might not with advantage have been omitted; for the book is one for the trained chemist rather than for the novice, and such men do not need to be told that "if the balance be in danger of vibrations, shocks, or jars while in use, it should be placed on a firm foundation," nor that they should "never place solid reagents in direct contact with the pans." We are well aware that it is customary to include elementary instruction of a similar character in important chemical works of reference, and a generation ago many technical chemists may have benefited therefrom; but in view of the deluge of literature conveying elementary instruction in the use of analytical apparatus which has issued from the Press during the last three decades, and the general advance in chemical education, we think that the more advanced treatises—such as that now under consideration—could with advantage be condensed and cheapened by the omission of instructions of the kind commonly given to first-year students.

In the third chapter analysis by volumetric methods is discussed. The principles upon which volumetric analyses are based are clearly described, and details are given of volumetric methods of determining the proportion of certain elements in solutions of salts. Chapters IV. and V. deal with calorimetry, turbidimetry, filtration, and washing. The next chaper is on heating and drying, and commences with the sentence, "The burner (fig. 136) devised by R. Bunsen about 1855 is the best type for general purposes." Turning to fig. 136, we cannot see any form of burner delineated. The stand attached to a bunsen burner depicted in fig. 60 appears to us to suffer from instability. We should imagine that an accidental jolt of the burner would too readily scatter the contents of the basin being supported by the ring. There is some useful information in this chapter; but we are surprised to find no mention of Holloway's arrangement of silica points on adjustable rods supported on a tripod as a substitute for the triangles depicted in fig. 62. The Holloway crucible support is a great improvement on the old pipe-clay triangle. In the three concluding chapters of Part I., methods of pulverizing, grinding, and sampling clays and rocks are described, and some useful notes relative to the testing and preservation of reagents will be found.

Methods for the analysis of simple silicates are described in Part II., and for complex silicates in Part III. Methods for the determination of the rarer elements—such as molybdenum, tantalum, vanadium, and uranium—are given in Part IV., and special methods for the determination of calcium, magnesium, and the alkalies are described. The final portion of the book (Part V.) is mainly devoted to a description of the methods which should be employed for the determination of the acidic elements, sulphur, phosphorus, fluorine, &c.

The rational analysis of clays is dealt with in the last chapter of Part V.; and this chapter is of great interest to gas engineers at the present time, owing to the attempt which has been made to show that rational analysis is of great importance as a guide to the physical qualities of a fire-clay. Rational analysis is an analysis expressed in terms of the primary mineral constituents (quartz, felspar, and clay substance) of the clay, while an ultimate analysis merely gives the proportions of the different constituents of the clay without indicating its mineralogical composition. We are glad to see that Dr. Mellor shows very clearly that no reliability can be placed upon rational analyses, for the reason that all the methods of rational analysis at present known are liable to give results which are seriously erroneous. Chemical analysis alone is of little service as a guide to the refractoriness or other physical properties of a clay. It is true that a fairly accurate ultimate analysis of a clay can always be made, and may reveal the presence of an excessive proportion of a fluxing agent; but two clays of very similar chemical composition may differ widely in fusibility and other physical properties. This is not surprising, in view of the fact that some of the elements themselves—such as carbon and silicon—can have their physical properties radically changed without undergoing any change in their chemical composition. The absurdity of some of the rational analyses which are published is shown by Dr. Mellor's statement that he has seen analyses of the same clay from two laboratories reported in terms of mica, quartz, and clay substance in one case, and felspar, quartz, and clay substance in the other. Dr. Mellor says frankly that the methods of rational analysis are highly artificial, and that the results are affected by an uncomfortable number of assumptions. In some cases, he says, the rational analysis is accurate, valuable, and useful, but in others is inaccurate, misleading, and false.

Dr. Mellor's book is of the highest value; and every gas undertaking sufficiently important to retain the services of a chemist should be furnished with a copy. Though it costs 30s., it is well worth the money.

* "A Treatise on Quantitative Inorganic Analysis," with Special Reference to the Analysis of Clays, Silicates, and Related Minerals; being Vol. I. of a Treatise on the Ceramic Industries. By J. W. Mellor, D.Sc., London. Charles Griffin and Co., Limited; 1913. [Price, 30s. net.]

HOW TO USE GAS.*

A brochure by de Heer van Rossum du Chattel, the Manager of the Amsterdam Corporation gas undertaking, on "How to Use Gas," has been published as one of a series of popular booklets on various subjects. Its object is to give to the Dutch public a short but clear exposition of how to gain the greatest advantage from the use of gas.

It opens with the advice that precaution and economy should always be observed. The precautions necessary to avoid danger from escapes of gas are clearly set out; and the disadvantages which ensue from waste are indicated. In the subsequent treatment, the purpose and use of the main tap and of the meter are described, and instructions are given for reading the meter-index. Then follow remarks on the internal fittings for a house, and a description of gas-burners, in the course of which directions are given for the cleaning and care of the ordinary incandescent gas-burner. Gas-fires are described, with particular reference to the reflector type. Boiling rings of standard patterns are referred to; and the necessity for keeping them clean is emphasized. Then follows an account of geysers and gas-heated irons. In conclusion, readers are advised to apply in any case of trouble or difficulty in the use of gas to the management of the gas-works.

The brochure has eight illustrations. It should be extremely useful in spreading knowledge of the advantages and the proper methods of using gas among the populace of Holland.

* J. van Rossum du Chattel; Directeur Gem. Gasfabrieken te Amsterdam. "Hoe Moet Ik Met Gas Omgaan?" Amsterdam: Maatschappij voor Goede en Goedkoope Lectuur.

Joint English and Scottish Junior Association Meeting.

A full programme has been arranged for the joint visit of the English and Scottish Junior Gas Associations to the National Gas Exhibition on Saturday, Oct. 18. In the morning, by permission of Mr. D. Milne Watson, the General Manager of the Gaslight and Coke Company, a visit may be paid to the Fulham Gas-Works and the Harwood Terrace Stove Depôt; while for those who prefer sight-seeing a list of suitable places is provided. One suggestion made is a visit to the Imperial College of Science and Technology, where an inspection may be made of Professor Bone's department. A 1.15, on the invitation of the Directors of the Gaslight and Coke Company, members will assemble for light refreshments at the Harwood Terrace Stove Depôt; and a move will afterwards be made to the Exhibition. A joint Council meeting will take place at Harwood Terrace at 2.15. The next general assembly will be at 4.45, for tea, in the reception room at the exhibition; and after tea Mr. F. W. Goodenough, the Chairman of the Executive Committee, will briefly describe the various points of interest in the exhibition. The evening arrangements are left entirely in the members' own hands; and it may be added that ladies are specially invited to join the party.

Midland Junior Gas Association.—The Council have decided that the opening meeting of the forthcoming session of the Association shall take place on Thursday evening, Oct. 9, when Mr. W. H. Johns, of Saltley (the newly-appointed Gas and Electrical Engineer at Malvern), will deliver his Presidential Address. The place of meeting has not yet been determined upon.

British Association Proceedings.—Two or three trifling corrections are necessary in the lengthy report of the proceedings at the recent meeting of the British Association which we dealt with in last week's issue under the heading "Proper Utilization of Coal and Fuels Derived Therefrom." In Table I., p. 842, the fifth line of figures under the heading "Net K.C.U. Developed in Gas" should have been 3522, not 3552. In Table II., under the head "Percentage of Net Heat of Combustion—Radiated," the figure 30·3 should have read 50·3; and the last figure under "Convected" should have been 22·6, not 22·7.

BILL-POSTING STATION LIGHTING.

YET another use has been found for gas! Numerous eye-compelling flash and other signs have already shown people that gas can be of great assistance to the advertiser; and now it is proved how easily further aid can be furnished to publicity seekers by the illumination by it of hoardings. The tempting announcements in such positions have hitherto only been completely visible during the daylight hours; and their value as advertisements will be much enhanced if they are made to appeal equally to passers-by at night. That this will be largely done in future there can be little doubt, now that—as the accompanying picture shows—it has once been so successfully accomplished. The photograph, it should be mentioned, was taken in the New Cross Road, at the corner of Troutbeck Road.

The loss to advertisers and to the public through the want of proper lighting of hoardings of this character has been recognized by the South Metropolitan Gas Company, who accordingly took the matter in hand, and evolved a scheme which, while doing nothing to detract from the value of the announcements by day, so illuminates them that "those that run may read" at night. What has been done is to devise a casing which serves as a reflector, and completely hides the source of light from the eyes of the passers-by. On the particular advertising station referred to,

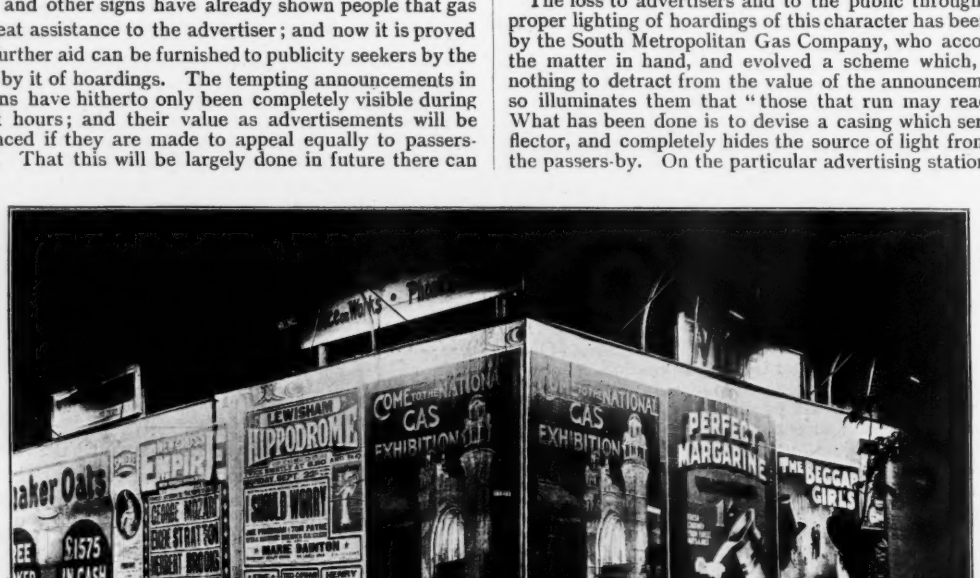


Photo. by *John H. Avery and Co.*

A GAS-LIGHTED ADVERTISING STATION IN THE SOUTH METROPOLITAN GAS COMPANY'S DISTRICT.

there are five of these casings, each one of which is provided with three 6 cubic feet per hour inverted burners. It is owing to the special form of the reflector that the excellent diffusion of light is obtained which the photograph shows. It will be noticed that the long posters are so illuminated as to be easily readable from top to bottom.

The illustration is a particularly seasonable one just at the present moment, inasmuch as this number of the "JOURNAL" contains a general description of the National Gas Exhibition, two of the posters announcing which occupy a prominent place on the hoarding. The remark that more will no doubt be heard of this novel system of night advertising is not altogether a random shot, for it is a fact that the innovation has already created a considerable stir among the bill-posters of South London.

GAS-FIRE ADVANCE.

Some Remarkable Figures.

DURING the next few weeks, an altogether exceptional amount of attention will—through the Shepherd's Bush Exhibition—be drawn to the progress of the gas industry, and particularly to the great advances made in recent times in the construction of apparatus for the utilization of gas for obtaining light and heat. It may be said, therefore, there is a peculiar appropriateness in the announcement now of figures of tests made with a new construction of fire which certainly mark a wonderful advance in gas-fire practice. The figures are those of an engineer whose independence is unquestioned; and the makers are a firm whose goods have for many years been in the front rank of gas appliances. Such extraordinary results as are revealed have not, of course, achieved themselves. Far from it; they are the outcome of much earnest labour and patient investigation. Thus Messrs. Wilsons and Mathiesons, of Leeds, the firm in question, are to be congratulated, not upon any stroke of good fortune, but upon the successful accomplishment of work which must prove of the highest importance, not only to themselves, but to the gas industry generally. After finding that surface combustion did not give them the gas-fire they were seeking, they persevered in other directions; and now a stage has been reached which promises to mark a new era in gas-fire construction.

THE "SOLA" GAS-FIRE.

The name of the "Sola" has been given by Messrs. Wilsons and Mathiesons to their new fire. The efficiency figures will be quoted later, on authority other than our own; but there are other points about the fire of which it is possible to speak from personal experience, after an inspection at the London show-rooms of the firm. In appearance, the fire leaves nothing to be desired. It is really artistic; and on this ground alone it would prove popular. The fuel—which was referred to in the "JOURNAL" three weeks ago, and which will fit all standard-sized fires—is evenly heated; and, as previously explained, it is scientifically constructed so as to give increased radiating efficiency, and at the same time is made in such a manner as to secure perfect hygienic conditions for the fire. All removable parts of the fire, except the fuel-rest, are secured by screw-knobs, which can be turned by the hand; and the parts can be assembled from the front when the fire is *in situ*, so that the work of installation is reduced to a minimum. The fret makes a tight joint both with the frame of the fire and with the hearth on which the fire stands; and dust cannot accumulate beneath it. The "Sola" fire (which, it should be added, is fully protected) is incorporated in three handsome settings—a square-topped model, a round-topped model, and a model based on the firm's well-known "Warwick" fire.

THE BURNER.

Now we come to what, however desirable good appearance may be, must, after all, always remain the most important part of a gas-fire—that is, the burner. In designing the burner, which is perhaps the main secret of the success of the "Sola" fire, the two fundamental conditions which Messrs. Wilsons and Mathiesons aimed at were high flame temperature and silence. In other words, they sought to largely increase the usual silent flame-temperature, and at the same time to produce a silent flame; thus overcoming the fatal objections of noise and risk of lighting-back—recognizing that in the increase of flame-temperature lay the possibility of increasing the efficiency of the gas-fire to any material extent. The increase in primary aëration and therefore in temperature will be understood from the fact that, instead of (say) from $1\frac{1}{2}$ to $2\frac{1}{2}$ volumes of air to one of gas, with the firm's new burner a supply of gas at ordinary pressure will draw in between four and

five times its own volume of air. The result is an intensely hot, well aërated flame, which brings the fuel to incandescence in the shortest possible space of time, and raises it to a very high temperature indeed. Experiments showed there is no tendency on the part of the flame to light-back; and when the supply-tap is turned off, the flame quietly dies away.

Increased power of the fire is derived from the fact that it is possible to burn efficiently up to 5 cubic feet of gas per hour, in the form of a concentrated well-aërated flame, which means a consumption of 35 cubic feet per hour for a seven-jet 10-inch fire, the consumption at which the following test was made, as against, perhaps, an average of 25 cubic feet for the same sized fire with the ordinary type of burner. And, in addition to this extra consumption, there is the increased efficiency, which is stated at 43 per cent. These figures, borne out in every-day practice, will mean that two of the seven-jet fires burning 25 cubic feet per hour each would give about the same amount of radiant heat as one of the new seven-jet type consuming 35 cubic feet. On the other hand, the "Sola" fire possesses great elasticity, inasmuch as the flames can be reduced until less than 2 cubic feet per hour per jet is consumed. The use of a duplex burner and tap offers even greater margins. Any quantity of gas between 10 cubic feet and 45 cubic feet per hour can be effectively utilized in the nine-jet "Sola" fire.

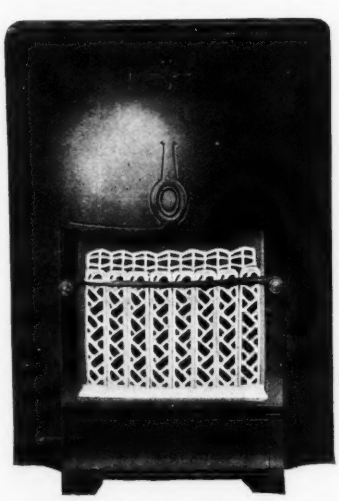
The Tests.

This notice of Messrs. Wilsons and Mathiesons' latest creation began with a reference to tests; it must be concluded with the quoting of the actual figures—in justification of what has been said. The "Sola" fire was submitted to Mr. John Bond, of Southport, whose extensive researches in pyrometry are well known; and he had it under test for two days, in comparison with a 10-inch "Carlton" fire—both being seven-jet patterns. The comparative results he summarizes as follows: "Your 1912 fire, fitted with fuel of that date, gave 51·0 radiation. The same fire fitted with the 1913 fuel gave 59·7 radiation. Your 1913 fire, fitted with your 1913 fuel, gave 73·1 radiation." From this it will be seen that the new fuel secured a marked advance in efficiency, while the new burner has made a further extraordinary improvement on the top of that.

The fire branch of the gas business is continually increasing in importance; and the industry will recognize that acknowledgment is due to Messrs. Wilsons and Mathiesons for the enterprise they have displayed in endeavouring to still further popularize what is really one of the greatest conveniences of modern life.

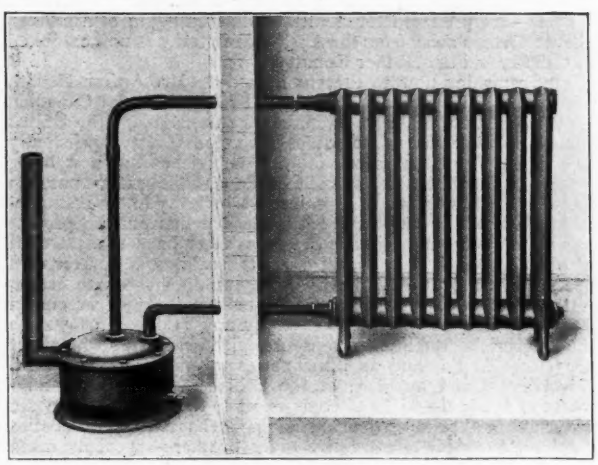
DAVIS GAS-STOVE COMPANY'S NEW GOODS.

In making reference to the specialities of the Davis Gas-Stove Company, of Luton, though for the 1913-14 season there are several new introductions deserving mention, the first place must again be given to the thoroughly well known, and as thoroughly popular, "New Barless" gas-fires. After saying that they are thoroughly well known, it would, of course, be a contradiction to occupy space here by explaining the principles on which these fires have been built up; but it should be stated that the already large series of "New Barless" fires has been very considerably augmented by new sizes, noteworthy among which is the 8-inch fire now introduced for the first time. The prices of almost all these fires in porcelain finish have been materially reduced.



New Davis "A" Pattern Fire.

In addition to the above, a still further step in the matter of interchangeability has been taken by introducing a series of no less than 34 fires, known as the "A" pattern, the fuel in which is of special construction, and is interchangeable with that of other makers. The distinguishing feature of these fires is a light and easily detachable front bar, which differentiates them from the other "New Barless" pattern. Apart from the special features of the "A" pattern gas-fires, they embody all the advantages of the previous "New Barless" series, including the unique system of interchangeable fronts, absolute simplicity, and perfect hygienic efficiency. Every fire of both series passes the "Shadowgraph" test before leaving the works; and all are claimed to give the highest possible radiant efficiency. A very noteworthy and practical advantage of these fires, from a gas company's point of view, is that any of them may be fixed without any flue pipe whatever—the only exception being where there is a very bad down-draught. This advantage will be obvious to everyone concerned in the fitting of gas-fires in connection with modern grates, where it is very often difficult (or quite impossible) to fit any flue-piping at all. Every one of the Davis fires is said to be "hygienically perfect in use, without the aid of any added flue pipe." Duplex burners are included, without extra charge, in the case of all fires measuring 13 inches and upwards; and such burners have been introduced into this series of fires in the case of the 10-inch and 11-inch stoves. This is a departure which, it is anticipated, will be extremely popular among buyers and gas consumers alike.



The "R.A.C." Boiler Fitted to a Radiator.

A special feature is made of the "R.A.C." boiler for greenhouses and garage heating; this being a system which represents modern methods applied throughout to secure ample efficiency and low expense. The "R.A.C." is placed in a special receptacle or hutch outside the motor-house or greenhouse, thus economizing space and at the same time protecting the boiler itself from climatic changes and draughts. It also entirely dispenses with the necessity of connecting flue-piping The top, sides, and front of the special hutch are so constructed that they can be removed as one piece, leaving the boiler standing upon its base—a convenient arrangement for any periodical inspection which may be required. The small dimensions of the "R.A.C." boiler are a distinct advantage, making it possible to place it in a spot which would otherwise be looked upon as waste ground. The relative positions of the water-connections, gas-connections, and flue-outlet can be varied to suit the particular requirements of each installation. The "R.A.C." is of the simplest possible construction, so that it may be dismantled with the minimum of trouble; and every part is arranged to be readily accessible for cleaning purposes. This makes it possible for the highest standard of efficiency to be maintained at all times.

The firm are introducing also some very handsome dog-grates, as well as a patent safety radiator for garage use; and an opportunity may be taken later of giving some particulars of these.

The Future of the Coal Supply.—The twenty-fourth annual meeting of the Institution of Mining Engineers opened last Wednesday morning in the Lord Mayor's Parlour of the Manchester Town Hall. In the course of his address, the President (Dr. W. E. Garforth) said that large industrial concerns were extending from Manchester in all directions, and mining engineers realized that they must do their utmost to provide them with a cheap and plentiful supply of coal. Many of the thickest seams, of course, had been worked out during the last hundred years, and therefore the colliery owners had had to resort to the best means they could find of working the thinner seams. He could say that during the last decade they had been able to work many of these thin seams by means of mechanical appliances that were not contemplated some years ago; and they were raising, perhaps, at the present moment, an even larger output of coal by such means than it had been possible to raise from the thick seams in the past. He believed they could look forward for many years to come to having a cheap and plentiful supply of fuel. As regards cheapness, there were troubles with the miners; but he expressed the hope that, notwithstanding their difficulties, the common sense of the employers and employees would prevail, and enable their industry to maintain the position it had now held for many years among the nations of the world.

A COMPARISON OF BRITISH AND AMERICAN GAS AFFAIRS.

"Vagrant Thoughts" by a Dweller in the United States.

YOUR Lord High Chancellor, in his recent inspiring address at Montreal, dwelt upon the ties linking together Great Britain, Canada, and the United States, and how the nearly similar characteristics of the inhabitants in each country, acting through a well-defined body of public opinion, tended towards similar national aims. In reading the speech itself and many of the favourable newspaper comments, the thought occurred to the present writer to consider some of the points of similarity, and also of difference, in the gas industry as it exists to-day in Great Britain and in the United States. But before beginning this particular application of Lord Haldane's very thought-provoking general subject, it might be said that many of us—viewing the great increase of Italian and Slavic immigration, and noting the children of these immigrants as they crowd our streets and schools—are prepared for a further differentiation of American characteristics away from the Anglo-Saxon traits as now exhibited in Canada and the Mother Country.

But, returning now to the gas industry. Mr. Arthur Hewitt, of Toronto, in his recent Presidential Address to the Canadian Gas Association, said: "Fortunately for Canada and the United States, the English gas companies have stuck pretty consistently to coal gas; and the results of their experience are now being studied in the United States and Canada with the greatest possible interest." This covers the greatest dissimilarity in the manufacturing methods of our two countries, and points out the present value to us of your prejudice (we sometimes have thought of it as obstinate) in favour of coal gas. It is almost a quarter of a century since Mr. G. C. Trewby came here to investigate carburetted water gas. His plant was, I believe, the pioneer one in England; and that there are so many now is due somewhat to the enterprising qualities of those American engineers who about 1893 went to England as missionaries to spread the new light. Nevertheless, if I mistake not, the Britisher—other things anywhere near equal—sticks to coal gas, while the American chooses water gas, and believes that in so doing he has effected economies overlooked by his conservative older brother—especially those possible in a combined coal and water gas plant.

As this is not an exhaustive treatise, but merely a bit of discursive writing, let us pass on to distribution. We gave you the idea of high-pressure; and yet we do not afford to our customers in large cities the service that Fleet Street now enjoys. In other matters of distribution, the points of difference are many. Our general distribution mains are, as a rule, larger and laid at a greater depth. Our service pipes have for years been either of steel or wrought iron; and neither for service nor for interior piping work have we used your "compo" material. Our prepayment meters use a quarter instead of a penny; and we wonder why yours could not have been fixed for sixpence, and saved the economic waste involved in handling the present mass of copper.

In "New Business" matters, we believe we are in the lead; though sometimes we wonder whether our accounts really show all the expense due to our selling activities, and if some of our increased sales are worth what they cost. In management, our president or general manager corresponds to your managing director; and here, as in our engineering positions, we probably have a larger number of technically trained men than you. It is quite common for an engineering graduate, beginning as a cadet engineer at $60 a month, to receive $75 in a year, $90 in two years, and in four or five years, $100 to $125. The best of these men produce results that were never obtained by the men who worked up from the ranks and secured all their knowledge in the school of practical experience.

Considering now the outward manifestations of the industry as a whole, there are the Gas Associations and the Gas Journals. Your Association history has been along somewhat similar lines to ours, involving two more or less national bodies side by side, an amalgamation, and then, later on, a new national society to care for the commercial end of the business, persistently neglected by the older Association, which in both countries specialized on manufacturing subjects, apparently oblivious to the fact that all the profits are no longer made in the retort-house. Some of us here still hope to have one society covering every phase of our industry; and there is a campaign of enlightenment in progress, with its aim the convincing of our gas workers that Gas Association meetings should resemble those of the British Association for the Advancement of Science, with a section for each specialized branch of our profession.

When we look at the Gas Journals, we see in each country two in general circulation. Viewed at long range, and yet with the knowledge of a reader for twenty years, it seems that the "JOURNAL" may fairly claim to combine the respect due to its volumes being the history of the industry in English-speaking lands, with the authority derived from a weekly evidence that no phase of present growth or activity is being neglected. On our side of the water, I believe the weight of opinion is that our Gas Journals do not adequately represent the industry. With us, length of years has not been accompanied by proper growth; and youth has not entirely lived up to its opportunities. It is probably true that the genius of the Britisher lends itself better to that co-operation of engineer and editor which helps so much in making a Gas Journal truly representative. We think you "write to the times" too much; but we undoubtedly write too little, and therefore what we are doing does not get in print as easily as your accomplishments do. However, from the American editor's standpoint, all the more reason for exertion; and it is not probable that, for instance, the "JOURNAL" would contain the many descriptions of gas-works construction so valuable to every engineer planning works changes, if it followed the American practice of expecting the works engineer to write the article.

On its editorial side, the Gas Journal should be the spokesman of the industry before the world. In this country, our numerous public service commissioners, who are slowly learning the technique of the various businesses under their oversight, undoubtedly derive much of their education from the Gas Journals. Therefore it is with feelings of regret that we read editorials tinged with a superior attitude towards gas workers—recommending net heat units, when the industry is on record in favour of gross (and this is based on business as well as scientific considerations), and betraying ignorance of matters of common knowledge combined with a failure to defend the industry of which the editor acts as mouthpiece.

As an instance of the last indictment, here is an extract from a recent editorial item: "The price for the three London and the four Suburban companies varies from 26 c. (Tottenham) or 28 c. (South Metropolitan). . . . " Here the reason for the mistake is very apparent—the substitution of 24 c. for 2s. in the conversion of price. The editor, however, should be so well versed in matters of such common knowledge as London gas prices as to see at once that there must be a mistake, and not permit the error to go broadcast in places where the correction may be hard to make. Again, further down we read (still about London statistics): "We submit these figures for comparison with each individual works. It may make someone curious to know how they can afford to sell gas at an average of about 60 c." Indeed it may, and probably the "someone" will be a public service commission employee, or one of our two or three so-called gas experts, whose living is derived in the attempt to justify arbitrary gas price reductions made by municipalities. The editor should explain why the article did not contain information as to the candle power and calorific value of London gas, and did not state that any price comparison with America was unfair which did not take cognizance of this great difference in quality.

To end as I began. People of one stock but in different environments, attacking the same problem, work it out along different lines, as shown by this brief sketch of certain gas matters.

INSTITUTION OF GAS ENGINEERS.

The Council's Proceedings.

A Meeting of the Council of the Institution of Gas Engineers was held at No. 39, Victoria Street, S.W., last Tuesday—the PRESIDENT (Mr. Edward Allen, of Liverpool), in the chair. The following notes regarding the proceedings are to hand from the Secretary, Mr. W. T. Dunn.

A letter was received from the Prime Minister, acknowledging the resolution which was passed at the annual meeting, on the subject of legislation as to canals and waterways.

The report of the Dedication Ceremony of the Kelvin Memorial Window in Westminster Abbey was received. Accompanying the report was an illustration of the window, which will be suitably mounted and placed in the library.

It was reported that the names of Mr. John Bond and Mr. F. J. Bywater had been added to the Joint Committee on "Standard Specification of Street Lighting," and that Mr. W. B. Randall had become a member of the "Refractory Materials Committee."

The date of the Institution's annual general meeting in Liverpool next year was considered; and it was decided that it be held on Tuesday, Wednesday, and Thursday, June 16 to 18.

A number of applications for membership were submitted; and names were approved for inserting in the next ballot-list to be issued. Several names were taken off the register owing to death, resignations, and arrears of subscription.

Arrangements were made for filling the vacancy as a Member of the Council caused by the election of Mr. John Young as Vice-President.

Messrs. Thomas Berridge, S. Y. Shoubridge, and John Young were nominated as the three members of the Finance Committee to serve on the Committee of Management of the Benevolent Fund for the year 1913-14.

A letter was received from the University of Leeds announcing that the Senate, on the recommendation of the Board of Science and Technology, had renewed the Institution Fellowship for Gas Research to Mr. Harold Hollings, B.Sc., for a further period of one year.

Reports of the Finance and Parliamentary Committees were presented and adopted. In addition to other matters, the latter contained reference to the action of the Committee with respect to the Smoke Abatement Bill and the Weekly Rest Day Bill.

Preliminary arrangements were reported for the research on ventilation which is to be carried out at the Leeds University by means of a grant voted by the Council from the Special Purposes Fund. The Joint Committee having this matter in hand consists of Messrs. John Bond, J. H. Brearley, E. W. Smith, and

Charles Wood, representing the Institution, and Professor Arthur Smithells (the Chairman of the Committee), Professor John W. Cobb, Professor J. B. Cohen, and Mr. S. R. Thompson, representing the University. It has been decided that, in the first instance, the research should be confined to the influence of gas light and of gas-fires upon the ventilation of a room. Mr. W. Harrison, M.Sc., has been appointed Research Chemist to the Committee.

Consideration was given to a letter from the Joint Council of the English Junior Gas Associations, as to the possibility of providing a closer bond of union with the Institution. While wishing to encourage the Junior Associations, the Council expressed the view that the object desired would be best attained by a closer union with their respective Senior District Associations, which by the scheme of affiliation were represented on the Council of the Institution.

A short statement was presented indicating the progress which had been made with respect to the "Standard Specification of Street Lighting."

A report was received from the Sub-Commitee on "Examinations for Gas-Fitters." Three Examiners were nominated; and it was decided to communicate with the District Associations in regard to the formation of Local Committees.

An invitation to the members of the Institution was received from the Engineering Societies of America to attend the International Engineering Congress at San Francisco in 1915. It was decided to communicate the invitation to the members in due course.

BRITISH COMMERCIAL GAS ASSOCIATION.

Programme of the Second Annual General Meeting and Conference.

We have received the programme of the Second Annual General Meeting and Conference of the British Commercial Gas Association, which will be held, under the presidency of Mr. Edward Allen, M.Inst.C.E., of Liverpool, on Tuesday, the 21st prox., in the Guildhall, London (by invitation of the Right Hon. the Lord Mayor and Corporation), and on the following day at the National Gas Congress and Exhibition.

On the first-named day, there will be a reception of the members and visitors at eleven o'clock, in the Council Chamber, Guildhall, by the Lord Mayor (the Right Hon. Sir David Burnett), after which Sir Corbet Woodall, D.Sc., will welcome them on behalf of the Metropolitan Gas Companies. An address by the President will follow; and then the second annual report and statement of accounts will be presented by Mr. F. W. Goodenough, the Chairman of the Executive Committee. Two Scrutineers will be appointed to examine the ballot lists for the election of President for the ensuing year; and this will bring the morning sitting to a close.

In the afternoon, two papers will be read and discussed—viz., "The Work of the National Commercial Gas Association, and American Publicity Methods," by Mr. Oscar Fogg, of New York; and "The Study of the Problems of Domestic Economy as a Factor in Salesmanship," by Mrs. M. A. Cloudesley Brereton. The sitting will close at five o'clock.

At 6.15 p.m., there will be a reception by the President to meet the Aldermen, Sheriffs, and the members of the Corporation of London; and half-an-hour later the second annual dinner of the Association will be held in the Guildhall. At 8 p.m., Mrs. Cloudesley Brereton will hold a reception to meet the Lady Mayoress and the lady members of educational, sanitary, and other public authorities invited to a lecture to be given at 9 p.m., in the Council Chamber, by Professor Vivian B. Lewes, F.I.C., F.C.S., on "The Development of Gas as an Illuminant and as a Fuel: A Century of Research and Invention."

On Wednesday, the members will assemble at 10.15 a.m. in the Congress Hall at the National Gas Exhibition. The following papers will be read and discussed: "The Application of Business Principles to Gas Supply," by Mr. Thomas Waddom, of Newcastle-on-Tyne; and "Hot Water Supply as a Field for Increased Sales," by Mr. A. E. Broadberry, Assoc.M.Inst.C.E., of Tottenham. There will be an adjournment at about 1 o'clock, when the members will partake of luncheon on the invitation of the Directors of the Gaslight and Coke, South Metropolitan, Commercial, and Brentford Gas Companies.

The proceedings will be resumed at 3 p.m., when a paper on "The Development of the Use of Gas for Industrial Purposes," by Mr. H. M. Thornton, J.P., of London, will be read and discussed, the place of meeting next year decided upon, and the general business transacted.

This will bring the meeting to a close.

In the notice of the wedding, in Exeter Cathedral, of Dr. Hubert Depree and Miss Lilian Mary Willey, which appeared in the "JOURNAL" last week (p. 829), it was mentioned that, owing to the illness of the bridegroom's mother (the wife of Alderman F. Templer Depree, head of the firm of Messrs. Willey and Co.), no peal was rung on the bells of the Cathedral. The many business and personal friends of Alderman Depree will regret to learn that the happy event above referred to was followed by a severe bereavement in the death of Mrs. Depree, which took place on the day the announcement was made in our columns.

AMERICAN GAS INSTITUTE MEETING.

List of Papers to be Submitted.

It was mentioned in the "JOURNAL" for the 16th inst. that the list of communications to be submitted at the annual meeting of the American Gas Institute, to be held at Richmond (Va.) from the 15th to the 18th prox., showed that the members would have for consideration matter of importance to all branches of the profession. The titles of some of the papers have already been given; but the following is a complete list.

"Installation of Cast-Iron Street-Mains," by Mr. Walton Forstall, Assistant-Engineer of Distribution at the Philadelphia Gas-Works of the United Gas Improvement Company.

"Installation of Mains and Pipe-Lines of Steel and Wrought Iron," by Mr. H. L. Rice, General Manager of the Western United Gas and Electric Company, Aurora (Ill.).

"Street Main Standards," by Mr. G. I. Vincent, Engineer of the Des Moines (Ia.) Gas Company.

"Protection of Street-Mains by an Adequate System of Inspection," by Mr. C. C. Simpson, junr., Assistant General Superintendent of Mains of the Consolidated Gas Company of New York.

"Protection of Street-Mains by the Intelligent Use of Underground Space," by Mr. J. A. Gould, Engineer of Distribution of the Consolidated Gas Company of Boston (Mass.).

"Organization and Equipment for, and the Method of Handling, Street Leaks," by Mr. A. D. Whittaker, Superintendent of Works of the Atlanta (Ga.) Gas Company.

"The Behaviour of Water in Holder Cups, by Mr. H. W. Aldrich, Assistant Engineer of Construction of the Consolidated Gas Company of New York.

"Materials for Oxide Purification, and the Method of Testing Same," by Mr. W. H. Fulweiler, Chemist to the United Gas Improvement Company.

"Automatic and Distance Ignition of Gas," by Mr. F. H. Gilpin, of the Photometrical Laboratory of the United Gas Improvement Company.

"The Handling, Storing, and Sale of Coke," by Mr. J. W. Shaeffer Superintendent of the Milwaukee (Wis.) Coke and Gas Company.

"Removal of Water from Coal Tar," by Mr. S. R. Church, of the Barrett Manufacturing Company, New York.

"Surface Combustion," a lecture by Professor Lucke.

"A Portable Electric Photometrical Standard: Its Construction and Use," by Dr. Clayton H. Sharp and Mr. A. H. Schaaf.

"The Naphthalene Problem of To-Day," by the Committee (Mr. H. L. Underhill, Chairman).

"Power Economies in Gas Plants," by the Committee (Mr. C. L. Bruff, Chairman).

"Utilization of Gas Appliances," by the Committee (Mr. W. J. Serrill, Chairman).

"Progress in Carbonization Methods," by the Committee (Mr. Herman Russell, Chairman).

"Removal of Hydrogen Sulphide from Coal Gas by Means of Scrubbing with Ammonia Liquor," by Mr. J. G. O'Neil, of Geneva (N.Y.).

"Gas-Rates," by Mr. Alten S. Miller, Vice-President of Messrs. Humphreys and Miller, New York.

Arrangements have been made for a joint meeting of the Institute and the Illuminating Engineering Society, at which the following papers will be presented.

"The Importance of Direction, Quality, and Quantitative Distribution of Light in Illumination," by Mr. M. Luckiesh, Physicist to the National Electric Lamp Association, Cleveland (O.).

"Some Phases of the Illumination of Interiors," by Mr. P. S. Millar, of the Electrical Testing Laboratories, New York City.

"Gas Lighting of Interiors," by Mr. C. A. Luther, Illuminating Engineer of the Peoples Gaslight and Coke Company, Chicago.

"Street Lighting by Gas," by Mr. F. V. Westermaier, Engineer of the Welsbach Street Lighting Company, Philadelphia.

Gas Appliances in an American High School.—The fourth storey of the Washington Irving High School in New York includes a students' lunch-room and rooms devoted to the theory and practice of domestic economy. It is interesting to note the extensive use made of gas in the various departments, of which the following brief account was given in the "Builder" last Friday. In the cooking-room, the only source of heat is gas, because it was considered the best medium for the purpose, and the one with which pupils will have to deal chiefly in their after-career. The cooking-room is provided with counters on which are fitted thirty single-burner gas-stoves; and it contains two large gas-ranges, together with a dishcloth-dryer. The domestic science section consists of three rooms, all fitted with gas-cooking appliances, and a laundry where the ironing-stoves are heated by gas. The kitchen for the students' lunch-room is fitted with a large gas-range in addition to water-heaters and special ranges. The housekeeping kitchen contains a family gas-range with top 34 in. by 22 in. The gas-piping for the entire building is divided into four distinct systems, each with a separate meter, supplying gas to the laboratory fixtures, the domestic science section, the kitchen department, and for lighting throughout.

RAILWAY CARRIAGE LIGHTING.

Gas *v.* Electricity.

The question of the use of gas or electricity for the lighting of railway carriages was dealt with by a correspondent in the Engineering Supplement to "The Times" last Wednesday.

The writer begins by remarking that though it is now clear that the fire which broke out after the recent Aisgill collision was not caused by escaping gas coming in contact with a flame, but was due to live coal from the ash-pan getting among the luggage, there have been other accidents where gas has undoubtedly played an unfortunate part; and he cites some of them. On the other hand, he points out that there have been some very serious wrecks where gas-lighted trains were concerned in which no subsequent fire occurred. Among these may be noted the Welshampton accident of June, 1897; Wellingborough in September, 1898; Salisbury, July, 1906; Shrewsbury, October, 1907; Ormskirk, November, 1910; Charlestown Curve, June, 1912.

Dealing with the causes of fire, the writer remarks that, speaking broadly, fire due to live coal from the fire-box of the engine is as likely as fire from escaping gas. Not only, he says, may the disaster at Aisgill be adduced in support of this contention, but confirmation may be found in the Thirsk accident of December, 1892. But while it is quite possible and probable that, in the event of the cylinders being sufficiently damaged in an accident to allow the gas to escape, the gas would get away in a very brief period of time, there would still be a danger of its being ignited by a spark or an adjacent naked light. It would appear, therefore, that there must be some countervailing features in favour of gas lighting. Sir Guy Granet, in his statement at the Aisgill inquiry, remarked that foreign practice in this matter is in favour of gas rather than electricity. Certainly this is so, as far as the European Continent is concerned. Herr Wedler, in an article on "The Evolution of the Lighting of Passenger Carriages on the Prussian-Hessian Railway," in the "Organ für die Fortschritte des Eisenbahnwesen," a short time since, said: "Gas lighting by means of roof lamps is more economical than electric lighting. It is also more reliable, the light is steadier, and less attention and maintenance are required." According to the "Universal Directory of Railway Officials" the various railways in Germany own between them 59,796 coaches. Of these, in August, 1909. there were 56,622 lighted by gas. In France, there are 29,781 coaches, of which one-half are lighted by gas. In India, according to the Government returns, there were in 1908, out of a total of 19,604 coaches, 11,209 lighted by gas and 2770 by electricity. In 1910, out of 20,902 coaches there were 12.455 gas lighted and 3636 electrically lighted; while at the end of last year there were, out of a total of 22,454 coaches, 13,343 gas lighted and 5012 electrically lighted. Lastly, the writer gives some statistics from America. From figures got out in March, 1912, by a Special Committee on the Relations of Railway Operation to Legislation. it appears that 45·2 per cent. of the coaches on the railways of the United States were lighted by gas, 36·6 per cent. by oil, and 15·4 per cent. by electricity; while 2347 vehicles were lighted by both oil and electricity, and 3864 by both gas and electricity.

Coming to the question of cost, the writer quotes some figures given by Mr. Aspinall, the General Manager of the Lancashire and Yorkshire Railway, in the course of the discussion on a paper on "The Electric Lighting of Trains," read by Mr. Roger Smith at the Institution of Civil Engineers in November, 1911. He put the cost of fitting a coach electrically at about £130, as compared with £34 for equipping a gas-lighted coach, including the cost of gas-works and travelling gasholders; and he gave the maintenance of the former as £13 3s. 5d. a year, against £6 15s. 8d. for the latter. The writer, mentions, however, that Mr. Smith stated that Mr. Aspinall's figures would not hold for anything like equal illumination. From some figures obtained direct from the railway companies by one of the Editors of the "Railway Age Gazette," it appears that in America, taking the cost of gas with inverted mantles at $1, the cost of the other systems of lighting would be: Gas with open burner, $2·096; electric light from accumulators, $7·511; axle-driven electric light, $8·079; and electric light by dynamo in van, $8·304.

In the discussion on Mr. Smith's paper, Mr. Aspinall also gave some figures in regard to the cost of applying electric lighting to all the railway coaches in the country. He said that, at the end of 1909 there were, according to the Board of Trade Returns. 52,919 passenger vehicles in the United Kingdom, and careful estimates showed that 46,328 of them were fitted with gas, and 6591 with electric light, or possibly, as to a small number, with other means of illumination. The cost of installing gas on the gas-lighted vehicles was, according to the figures he had already quoted, £1,621,480, including the gas-works and travelling plant; while to refit them with the electric light would cost £6,022,640, and would further entail the throwing away of the £1,621,480 already spent. The total capital expenditure would thus be £7,644,120, and interest on capital and cost of maintenance, together with interest on the old capital, would be £1,037,014 per annum, against £500,199 per annum with gas lighting.

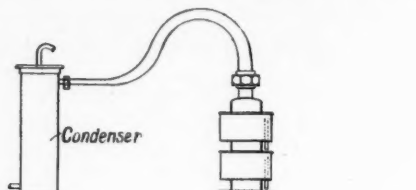
At the next meeting of the Imperial Continental Gas Association, the Directors will recommend the payment of a dividend of 4½ per cent. (less tax) for the six months ended the 30th of June.

TREATMENT OF CRUDE BENZOL FOR THE PREPARATION OF MOTOR SPIRIT.

A Special Process Still.

The great demand for benzol as a cheap substitute for petrol should at present be drawing the serious attention of up-to-date gas-works engineers and chemists; but very little has so far been done, with the exception of the Gaslight and Coke Company and a few other firms, with a view of placing this highly valuable bye-product on a commercial basis.

Benzol as a motor fuel seems to offer a gigantic field to the gas industry, seeing that it can be produced and placed on the market at 50 per cent. less than the present price of petrol. The chief drawback has been the lack of suitable apparatus for distilling the various hydrocarbon bye-products of gas-works—as crude benzol, coal-tar oil, naphtha, &c.—and to handle large or small quantities without laying down special and very expensive plant. Having this object in view, Messrs. Brown and Son, of Quill Lane, Putney, send for publication particulars of an apparatus they are introducing for automatically distilling from 10 to 1000 gallons of motor spirit per hour from crude benzol, coal-tar oil, &c., without any special chemical or mechanical knowledge or expensive plant. The machine, it may be mentioned, is made under the patents of Messrs. Ernest Brown and William Higgins.



In this process, crude benzol, coal-tar oil, or naphtha is placed in a high-column converting still, having a conical bottom (steam-jacketed) to allow for a continuous feed of the crude oils to be run into the apparatus during distillation. Fitted in the still-head or column are a series of water-trays for regulating the temperature of the various hydrocarbons coming over. The still is heated to a little above the temperature at which crude benzol or coal-tar oil is vaporized. The vapour is carried up, and the heavier vapour mechanically raised is condensed by regulating the temperature of the water trays, and falls down, while the light volatile vapours are passed through the condenser.

The heavy vapours not passing through the condenser are again sent through the still and are re-cracked by a higher temperature, so that the lighter vapours again separate from the heavier ones in passing through the column head and condenser.

The process it is said permits of the manufacture of large quantities of motor spirit from crude benzol or coal-tar oil that would ordinarily distil only a small percentage of the lighter fractions.

North of England Gas Managers' Association.—The seventy-third half-yearly meeting of the Association will be held next Saturday, in the Chemistry Lecture Theatre of the Armstrong College, Newcastle-on-Tyne, under the presidency of Mr. E. F. Hooper, of Sunderland. According to the programme issued by the Hon. Secretary (Mr. Herbert Lees, of Hexham), the members will assemble at the College at half-past eleven, and be conducted round the building by members of the staff. They will then proceed to the lecture theatre for the transaction of business, which will consist mainly of the admission of new members and the delivery of the President's address. In the afternoon, luncheon will be served in the County Hotel.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

Half-Yearly Meeting at Chepstow.

EVER since the announcement made at the May meeting that an invitation had been extended to the Institution to hold their next meeting at Chepstow, the members had been looking forward to the visit, which took place last Wednesday. Great as were the anticipations of a pleasant day, the realization in no wise fell short of them. The pretty old-world town was seen under perfect conditions, with a blue sky and brilliant sunshine; and then the welcome extended to the members was of the heartiest. The Chairman of the Gas Company (Dr. A. G. Lawrence, J.P.) was present to greet them on their arrival, and, with the exception of the business meeting, remained with them the whole day. In fact, in the pleasant recollections which will long remain with all who took part in the proceedings, Dr. Lawrence will figure as the one to whom credit is mainly due for the success of the outing. Under his guidance, an excellent programme had been arranged—which, of course, included a visit to the gas-works, of which Mr. James Robb is Secretary and Manager. To the visitors (to whom he had confided his age), Dr. Lawrence's great energy was cause for surprise—even after he had explained, in his words of welcome, the reason for the extreme vitality of Chepstownians. The business meeting was short—being practically confined to a highly appreciated Inaugural Address by the new President, Mr. H. D. Madden, the Engineer of the Cardiff Gaslight Company. Luncheon followed, and then just such a thoroughly enjoyable afternoon as kindly hosts could provide amid lovely surroundings. Business and pleasure could not possibly have been better combined.

The business meeting was held in a room which had been placed at the disposal of the members at the Beaufort Arms Hotel, and a very fair attendance of members faced Mr. T. E. FRANKLIN, of Barry, the retiring President, when he took the chair. Before the members settled down to work, they were given a cordial greeting, and some interesting particulars of Chepstow, by the Chairman of the Gas Company (Dr. A. G. Lawrence, J.P.) and the Chairman of the Urban District Council (Mr. James Price).

A WELCOME.

Dr. LAWRENCE said he rose with very great pleasure to give the Institution, on behalf of the Chepstow Gas Company, a very hearty welcome. It was a small town; and they did not invite the members there to inspect their gas-works, which were diminutive, though, under the excellent administration of Mr. James Robb, their capable Manager, the Company were trying to get them right up to date. The real reason why they invited the members there was so that they should resuscitate themselves after the very laborious work they had had in raising gas to the position of the premier light of the day. Chepstow was remarkable for the vitality of its inhabitants. In making his returns, he frequently had to record no deaths of persons under seventy years of age, and in many cases the deceased approached a hundred years. This spoke sufficiently well for the place; and he thought they would find the air very invigorating. The River Wye ran at the bottom of the town; and the daily rise and fall of this river was about 40 feet. Indeed, when they had a full tide, it ran up to 50 feet. This induced such a circulation of the air that none remained stagnant; and the mixture of the salt water with the fresh gave them an enormous amount of ozone. He hoped the members would have a thoroughly pleasant day in Chepstow.

Mr. PRICE said he also, on behalf of the Urban District Council, was delighted to welcome the members. Chepstow was not very big; but it was historical, and he hoped they would think it was beautiful. The visit of such an Association as theirs was a help to the town, and he trusted this would prove to be the forerunner of other similar visits. In conclusion, he expressed the wish that they might have a very happy day.

MINUTES OF THE LAST MEETING.

The HON. SECRETARY (Mr. Octavius Thomas, of Pentre) read the minutes of the last meeting, which was held at Barry; and they were confirmed.

CORRESPONDENCE.

The HON. SECRETARY then announced that he had received a letter from Mr. Edward Jones, thanking the members for the honour they had conferred upon him in electing him an honorary member of the Institution. He had also had letters regretting inability to attend the meeting from the President of the Institution of Gas Engineers and the Presidents of the various District Associations.

NEW MEMBERS AND STUDENTS.

On the proposition of Alderman THOMAS CANNING (Newport), seconded by Mr. J. A. BOUCHER (Maesteg), the following new members and students were elected.

Members.—Mr. Ernest Hornsby Clarry, Assistant Engineer to the Cardiff Gas Company; Mr. Owen Evans, Engineer and Manager of the Wrexham Gas Company; Mr. Leonard Murray, Assistant Manager of the Garw and Ogmore Gas Company.

Students.—Mr. Daryll James Branson, pupil at the Rhymney and Aber Valleys Gas and Water Works; Mr. Henry George Horwood, pupil at the Rhymney and Aber Valleys Gas and Water Works; Mr. William Trevor Kenshole, articled at the Merthyr Tydfil Gas-Works.

THE INCOMING PRESIDENT.

Mr. FRANKLIN remarked that he had now an exceedingly pleasant duty to perform, which was to formally introduce to them their new President, Mr. H. D. Madden, of Cardiff. No words of his were really necessary to introduce a man like Mr. Madden. They were fortunate indeed in securing as their President a gentleman of such sterling ability, and one who took so great an interest in the Institution. Under Mr. Madden's guidance, they were assured of a highly successful year. He would now call upon him to take the chair.

A VOTE OF THANKS.

The PRESIDENT said his first duty in his new position was to propose a very hearty vote of thanks to Mr. Franklin, the retiring President, for his services during the past year. They all knew how much he had done. Not only had he worked very hard for the Institution, but he had had a great deal of professional work at Barry, which must have rendered it extremely onerous for him. He had shown much energy all round.

Mr. A. W. BRANSON (Caerphilly), in seconding, remarked that they had realized, from their visit to Barry, and the amount of work which had been carried out, that Mr. Franklin had been very busy. He had filled the office of President in a modest and unassuming manner which they had all thoroughly appreciated; and they were sorry that his year of office had finished.

The vote having been carried with applause,

Mr. FRANKLIN said he was exceedingly obliged for the kind way in which the members had shown their appreciation of his services. He only wished he could have done more, so as to have felt that he had justified all the kind things that had been said of him. He hoped that at some future time the Institution would pay another visit to Barry, and inspect the extensions there when they were completed.

Mr. MADDEN then proceeded to deliver his Inaugural Address, the interest in which was increased by the display of several ingenious instruments of use to gas engineers.

INAUGURAL ADDRESS.

Gentlemen,—My first duty upon taking the chair is a pleasant one—to sincerely thank you for the honour you have conferred on me. It will be my great endeavour to carry out the work so entailed to the best of my ability, and for the advancement of our Institution.

AN AUSPICIOUS YEAR.

This year has been an auspicious one for the industry. Our parent Institution has successfully celebrated an historical epoch under the able presidency of Sir Corbet Woodall, and, further, the great Gas Exhibition will shortly make another important mark in the year's progress. With reference to the South Wales and Monmouth District Institution, it is pleasing to note that the *locus standi* is improved not only numerically, but also in the practical sense, and the linking-up made possible by the unity of the Special Purposes Section; and we undoubtedly owe a tribute to the Chairman and Directors of the Cardiff Gaslight and Coke Company, who have in so many ways strongly assisted our Institution and organization.

The subject for a presidential address in our industry is such a well-worn road that I have been exercised in my mind regarding the general headings to be embraced. By the courtesy of my Directors, the Institution have paid several recent visits to Cardiff and the Grangetown works; and you are all fairly familiar with the recent extensive schemes of construction and reconstruction work that were completed, or in course of erection, on the occasion of your last visit some twelve months ago. It is unnecessary to recapitulate them in any way. Additional works since that occasion are, however, in progress to meet the ever-increasing demands which the industry is in general experiencing.

OBTAINING BEST RESULTS.

There are, however, some points which are of common interest to us as an Institution, especially in these times when general prices are increasing, and one is bound to examine the unit of raw material—viz., coal—with a close and careful scrutiny, with the ultimate

object of accounting, on an analyzed balance-sheet, for the gases and residuals that have been derived from a coal ton unit of raw material carbonized. The values of gas coals in different parts of the country are not sufficiently similar for comparative purposes of results when compared with the semi-bituminous types of coal often employed in gas-works practice; but in any part, a ton of coal must be valued and judged on the merit and face-value of the local production. The acme of perfection in carbonization and general working is to get as near the centre of gravity of balance—if one may so term it—so that the maximum yield of gas is obtained consistent with the maximum yields of coke, tar, and sulphate for effectual disposal to set against the prime cost of the coal. At the same time, the yield of gas in cubic feet per ton should also be studied in combination with the calorific development of the gas; and it is a wise precaution to ascertain the total calorific multiple developed per ton of coal carbonized, which is an efficiency figure—in other words, the yield multiplied by the calorific value per foot equals the multiple of total heat units developed in the gas produced per ton.

TAR AND LIQUOR.

The volume of the residuals, tar and liquor, are chiefly dependent on the conservation of these products during the process of carbonization; and no law can be fixed that will ensure the best treatment and results for all and every class of coal. At the same time, however, individual classes can be carefully studied and investigated to ascertain the temperature of carbonization and the weight and duration of charge most favourable to the fullest development of the coal carbonized—of course, assuming in all cases that the seals, vacuum, and other essential adjuncts are carefully set, regulated, and efficiently worked. Undue and fierce heats of local action have undoubtedly a burning-up action on all products of the charge, and also on the retort-setting itself.

AMMONIA.

On the conservation of bye-products, the "JOURNAL OF GAS LIGHTING" has recently drawn attention to the idiosyncracy of the exceedingly great variations of ammonia yields per ton carbonized, even where similar classes of coal are employed; and I venture to say that carbonizing conditions and loss of volatile ammonia during storage are the greatest factors in the case, and will thoroughly repay most careful examination and supervision. In the development of the ammonia product as sulphate, in working it is preferable to daily isolate the quantity of ammoniacal liquor to be sent to the sulphate-works, and have the strength carefully ascertained by the Wills test. The theoretical quantity of sulphate can then be calculated out, and each day's manufacture carefully compared against the liquor used, and the efficiency ultimately worked out in percentage. The chemical theoretical value of the liquor in tons of sulphate is tabulated as 100, and the weight of sulphate actually produced therefrom compared with the actual theoretical value being also shown in efficiency per cent. of plant working. The effluent gases and waste liquor are, of course, regularly tested throughout the twenty-four hours; but the practice enables one to work as nearly as possible to the theoretical chemical value of the liquor and on the highest efficiencies of the sulphate plant, so as to reduce to a minimum the unavoidable losses of this transfer.

COKE.

Coke production per ton of coal carbonized is an increasingly important item; and progressive steps in this direction may be noted during the past few years. The open grate and direct-fired furnace gave way to the simple generator and, latterly, to the regenerative and recuperative system of firing, with increasingly efficient results. But it is also wise to consider that the modern regenerator, beautifully designed and thought-out as it is, will not work by itself, nor yield its most economical results by its own perfection. Although the quantity of coke used per ton of coal carbonized has been so considerably reduced by the adoption of these modern systems of regeneration, it is equally possible to further advance the fuel efficiencies by giving careful attention to the adjustment and working, so that results as near as practicable to theoretical are obtained.

REGENERATIVE FIRING.

On the question of regenerative firing, it would perhaps not be inappropriate to review the general position of working, in reference to which I had the honour of reading a paper before you some time ago, on furnace control. Assuming, therefore, a regenerator furnace carefully set as to its primary and secondary air and damper, this careful adjustment, with the complete combustion of the fuel gases, must necessarily be only true of the actual period of setting, which is nearly always adjusted to the mid-period between cleaning the fires. Therefore, during the period directly after clinkering excess of unconsumed carbon monoxide gases are leaving the setting and being consumed in the flue until such times as the grate settles to normal conditions. This period must, and does, represent a time wherein, even with the best-designed recuperative settings, fuel is entirely lost and wasted; and, owing to the freedom of the grate and primary air, quantities of coke are converted into furnace gases, of which a great percentage does not perform useful work. This is a reducible loss, and may be prevented if measures are taken. The writer's theory and practice in regard to this is to blanket the top of the producer fuel with fine breeze immediately before clinkering; the breeze acting as a deterrent to the fierce rush of primary gases until the breeze has fallen into the interstices of the coke and been practically consumed, by which time the producer is again in balance, and, as demonstrated, the losses of fuel due to free and excessive primary air action are obviated. In simple words, this regulation means conservation of coke.

I have recently seen in action a simple balanced flap-valve actuated by the intensity of the draught, which performs a governing action on the primary air, and achieves a reduction of furnace fuel [*ante*, p. 780]. This apparatus is the outcome of the thought of Mr. Brooke, of Nechells, Birmingham, to whom must be credited one practical form of heat and fuel conservation.

REFRACTORY MATERIAL.

The actions and reactions occurring within the settings, and the production of nascent gases and residuals in the retort, with the many questions of thermo-chemistry allied thereto, will always render the retort-house a centre of considerable interest to the engineer. The many forms of retorts and settings—vertical, horizontal, and inclined—also add further development and interest to the question; and, again, the development and use of refractory material for retort construction is one of manifestly increasing importance, and particularly the development of the silica retort material, both in England and America.

At this point, with your kind permission, I would be pleased to add how much we are all indebted for the work and information on this subject which has been so carefully carried out by the Refractory Materials Committee of our parent Institution, and the amount of time and careful attention bestowed upon it by the voluntary effort of consisting members.

With the modern trend of carbonizing practice, unquestionably porosity of material for immediate heat transference from the combustion zone to the charge is one of the most important factors, and well worthy of individual attention and observation, if all-round results are to be studied. During the past few years, with the advent of heavier charges, the cross walls of retorts have received more attention than heretofore, and, unquestionably, this consideration will amply repay, not only in the life of the setting, but on the many economies incidental to the working period of the retorts during gas making. The lifetime of settings is generally referred to in the number of days. It has, however, often occurred to the writer that tons of coal carbonized and cubic feet of gas made would indicate a truism which might otherwise be described "as the useful work performed per retort" in its lifetime.

CARBONIZING TEMPERATURES.

The question of carbonizing temperatures is so often discussed that to refer to it may be considered unnecessary. But in so many cases heats are judged by the eye, where the services of a reliable instrument would not only give closer but more valuable and surprising data. Pyrometers of the sighting type, which can be quickly moved from point to point, fulfil many useful purposes in gas-works practice; the Féry pyrometer being a most useful instrument on this particular score. The new Lunette pyrometer is also a serviceable instrument; being easily handled and relatively cheap.

True knowledge of the actual conditions and varying intensities of heat prevailing inside the setting are the only bases of a right judgment on this important question, and are very worthy of consideration. It is also interesting to note that a simple hand test apparatus has been evolved which permits very close estimations of the quantity of air entering to the primary and secondary ports. As yet I have had little practical experience with the instrument; but its utility may readily be conceived and grasped.

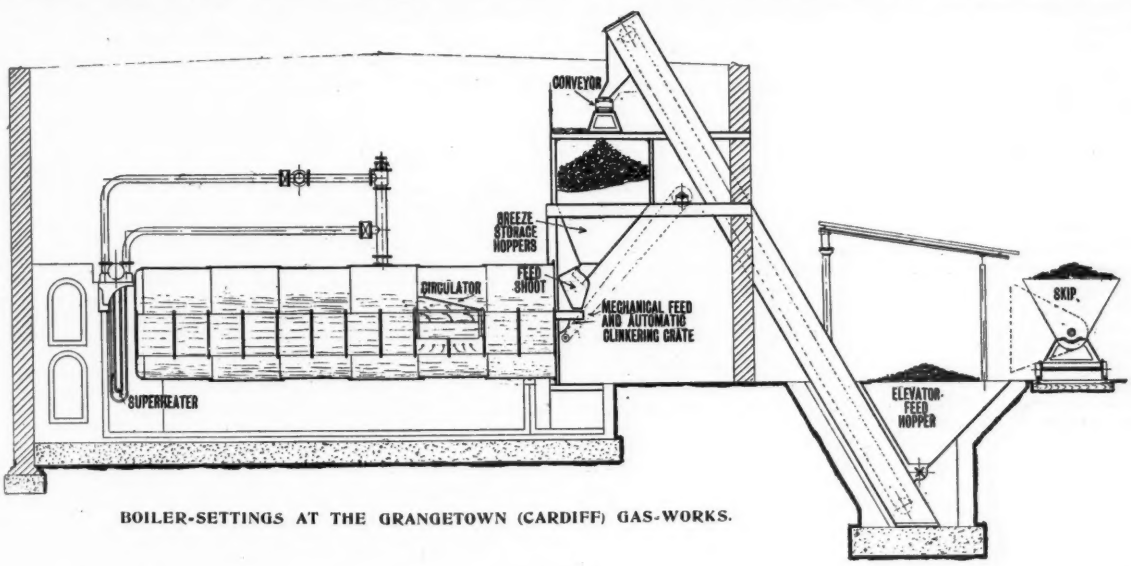
POWER PRODUCTION AND FUEL ECONOMY.

Power production on all sized works is becoming an increasingly important factor, and although gas-engines are employed very largely as prime movers, yet quantities of steam are an absolute daily necessity for so many purposes and employment; but the boiler-house so often does not receive the amount of attention it merits. In practically all cases of steam-raising on gas-works, coke or breeze or a works product is employed; and I venture to suggest that a careful study of this power plant affords ample means for fuel conservation. Breeze has now for years been utilized for this purpose, and is generally consumed with special grates under simple forced draught—the practice and economy proving satisfactory. Under ordinary circumstances, however, fuel efficiencies of boilers are of low order. Notwithstanding the protective properties of lagged shells and pipes, saturated steam and varying pressures are not unknown. Dry steam should approach a nearly perfect gas, and conform with Boyles law of expansion and contraction; and to have differing temperatures conforming with the pressures and efficiency in this department is an asset not to be despised.

During recent years, steam production has received specialized attention for the specific object of fuel economy. Superheated and dry steam is economical from all standpoints, and affords a greater range of transmission and efficiency, which is a valuable point in our practice. The volume and temperature of boiler flue gases is well known; the economizer for heating feed water takes advantage of this fact, and superheaters are a further means of heat economy. In generators where producer gas is made, undoubtedly superheated and dry steam provides results above anything effected by ordinary saturated steam. And this is equally true of oil and carburetted water gas production, in addition to the increased efficiency of the boilers. Circulators attached to

the furnace flue direct the heat of the furnace in a horizontal direction through the water, and effect the evolution of an increased quantity of drier steam, with a *pro rata* reduction of fuel expended; and either or both of these simple appliances add increased evaporative powers with correspondingly decreased fuel requirements, and, in addition, produce steam of drier and more effective service.

Mechanically-stoked boilers with self-cleaning grates burning inferior fuels are also to the fore; and as the matter may be of interest, an outline drawing of a recently batterized boiler-house at Grangetown is available for your inspection. It will be noticed that the breeze fuel is brought in side-tipping waggons, of some 3 tons capacity each, and shot into a deep, sheltered elevator pit. The fuel is raised by an elevator and conveyor into a line of feed hoppers, having twenty-four hours' storage capacity, above the boilers. The fuel gravitates to the eight mechanical stokers, and is fed into the boilers. The grates are self-cleaning by the moving action of the bars, and the clinker is dropped over and periodically raked out practically cold. The boilers are fed with feed water at boiling point—such heat being recovered from the condensers; and the



BOILER-SETTINGS AT THE GRANGETOWN (CARDIFF) GAS-WORKS.

boiler-flues are fitted with superheaters and with circulators. The routine of condensation, washing, and purification is also a large field for individual examination, inasmuch as the working of these individual appliances plays an important part on the heat units stored in the holders for distribution. Time contact in these processes is as necessary to-day as ever, and I believe especially so when relating to condensation—the initial stage of gas purification, wherein the illuminating and calorific constituents can be nursed through without undue detriment or injury.

DISTRIBUTION ITEMS.

Touching the question of distribution, which is one of increasing importance, I would here wish to draw your notice to the alternations of the peak loads, and to the intensity and variation of these as compared with some few years ago. Truly this points to the utility and popularity of gas as a distributed fuel, lighting, heating, and power agent. The incidence of the day load was so ably depicted at a recent meeting of the Institution that further reference to this point is unnecessary. Unquestionably high-pressure distribution has come to stay; and coated steel mains are a valuable ally in conjunction with its use, and not in this connection alone, seeing that our Institution is chiefly representative of mining districts where ground subsidence is very general, and strong tensile steel pipes fill a gap in more than one sense of the word.

In presenting this address, the point uppermost in my mind has been the study of conservation and efficiencies from several standpoints, which could no doubt be extended and amplified by the many past experiences of the individual members in their daily work. Many points appertaining thereto have necessarily to be omitted by reason of the short time available, but which undoubtedly suggest themselves to your minds. In conclusion, I hope that some items may commend themselves to you as matters of general interest.

At the conclusion of the address,

Alderman CANNING said he felt it a great pleasure to ask the members to accord the President a very hearty vote of thanks. They all knew of the etiquette which hedged round the Presidential Address—and a very useful etiquette it was—that the address was not to be discussed. This rule enabled those who agreed with what had been said in the address to abstain from repeating in less able language what the President had just told them; and it also enabled those who did not agree with it to veil their scepticism in impenetrable silence. There was one point in the opening part of the address with which he was perfectly sure all present would thoroughly agree, and about which there could be no scepticism of any kind whatever. This was in regard to the generous manner in which the Institution had at all times been treated by the Chairman and Directors of the Cardiff Gas Company, by their able Manager, Mr. George Clarry, and by their distinguished Engineer, Mr. Madden. They were under a deep debt of obligation to these gentlemen; and it was only right that they should recognize it. It was matter for regret that neither the Chairman of the Company nor Mr. Clarry was able to be with them that day. ["Hear, hear."] They were under an even deeper debt of gratitude to their new President, of whom he ventured to predict great things. He knew Mr. Madden, and was aware of the ability which he had brought to bear upon his work for the Cardiff Gas Company. He knew of his thorough method of dealing with things, and was not at all surprised that the address which he had just delivered had partaken more of the character of a scientific paper than the review that the members usually had on such occasions. For his own part, he welcomed it. They had heard a great many interesting things that morning, and some novel ones. There was not the slightest doubt that the address would give them food for thought—which was exactly what they came for. A general review of the gas business during the past little while could be easily put in a very few words. It had been a period of improvement all along the line. It was not only that they had improved in regard to the sales of gas, but they had also improved in the methods of production, as the President had shown them. Then they all knew the immense advances that had been made in all those mechanical appliances by the aid of which they had brought gas into the service of the public; and, in addition to all this, there had been another improvement, and not the least one of all. A great deal of the antiquated and unjustifiable prejudice that had been circulated against gas during the past twelve months had been wearing away. They were beginning to find out that many of the things that had been asserted as to the injurious character of gas, its dangerous qualities, and the rest had melted under the rays of advancing science. These were great improvements. He had been very pleased at the manner in which Mr. Madden had dealt with the important question of carbonization. This was still at the bottom of everything; for if they were not doing well in this respect, they could not expect to do well elsewhere. The President was perfectly right in what he said about comparing the coals of different localities. They could not compare the semi-bituminous coals of their district with the richer bituminous coals of other districts. But what they could do, as had been pointed out, was compare the value of the coal which they brought into their works with the actual value of their residuals, as well as the primary product, gas, which they obtained therefrom. This, he thought, was after all the practical point, and it was to it that they should direct their attention. He did not, however, know that he could venture to say more upon this matter without violating the rule to which he had already referred. They were grateful to Mr. Madden for introducing to their notice these simple and beautiful instruments for carrying out important work. Of course, it did not always depend upon extreme delicacy of construction whether an apparatus was good or bad. It frequently happened that one could get very accurate results in a less roundabout way; but, at the same time, he was sure that at the present moment every one who had to carry out practical work must be prepared to avail himself of the best scientific instruments he could lay hold of. They had arrived at the stage when no rule of thumb would do. Exactitude was required; and an accurate daily record of results was almost a *sine qua non*. They must feel grateful to Mr. Madden for the information he had given about steam. Some steam they must generate; and dry steam for transmission to a distant part of the works was an important point for those in charge of large

undertakings. There were doubtless many questions they would like to put; but they must be satisfied for the present with the particulars that had been given them. Their chief purpose now was to heartily thank the President for his address.

Mr. R. A. BROWNING (Neath) seconded the proposition, and expressed agreement with the remarks of the previous speaker on the character of the address.

Mr. L. J. LANGFORD (Abertillery), in supporting the proposition, said he felt that they had had an extremely interesting address, and that they would derive great advantage from a careful study of the many matters the President had dealt with.

The vote was then put to the meeting, and carried amid loud applause.

The PRESIDENT, in returning thanks, said he had originally intended to give the address at the next meeting in May; but this arrangement had been altered, and he had had to prepare his manuscript while on holiday, without any notes at all by him. Therefore, he would ask them to excuse any shortcomings of the address. When starting it, he thought of the words Mr. Franklin had used at the last meeting, when he suggested that the President might deviate a little from the usual lines in giving his address. The members of the Institution were mostly so far apart that they rarely had a chance of comparing notes; and so it occurred to him that an explanation of some of the apparatus he had on the table —though these things might not be absolutely essential on a gas-works—would give some food for thought, and prove interesting to the members.

REPORT OF THE SPECIAL PURPOSES SECTION.

The HON. SECRETARY presented the third annual report of the Special Purposes Section, giving an account of the various matters dealt with during the past year. Among other things, it was stated that arrangements had been made for holding evening classes for gas-fitters during the coming winter at Cardiff, Newport, and Pontypridd. The Directors of the Cardiff and Newport Gas Companies pay the fees of those students who have made the usual percentage of attendances at the classes, and have, in addition, presented valuable prizes to the most efficient students. The accounts showed a surplus of £11 in the Treasurer's hands.

Alderman CANNING said that, as the Chairman of the Committee, he would move that the report be taken as read, received, and adopted.

Mr. BROWNING seconded this, and it was agreed to.

REPRESENTATIVE ON THE INSTITUTION COUNCIL.

The PRESIDENT said it was the custom with them that the retiring President should be appointed as their representative on the Council of the Institution of Gas Engineers. He had pleasure in proposing that this procedure be adopted on the present occasion by the appointment of Mr. Franklin.

Mr. A. E. DAVEY (Aberdare) seconded this, and it was carried unanimously.

VISIT TO THE NATIONAL GAS EXHIBITION.

The PRESIDENT said the Council would be glad to have the views of the members with regard to the arrangements to be made in connection with the visit of the Institution to the National Gas Exhibition at Shepherd's Bush on Oct. 15.

The HON. SECRETARY remarked that there would be special trains; but he had not yet been able to get any definite information about the railway arrangements. As soon as he did do so, the members would be circularized. He did not see that they wanted to have a conference of any sort when in London. The only thing to do was to visit the exhibition. The special point was whether the members would like an organized lunch to be arranged for.

Mr. T. H. HAZELL (Newport), after a short discussion had taken place, said that, to settle the question, he would propose that arrangements be made for a united lunch in the exhibition buildings.

Mr. BOUCHER seconded the motion, and it was agreed to—the arrangements to be left in the hands of the President and the Hon. Secretary.

PLACE OF NEXT MEETING.

The fixing of the place for the holding of the next meeting was left with the Council.

THANKS TO THE GAS COMPANY.

Mr. J. H. CANNING (Newport) proposed a vote of thanks to the Chairman and Directors of the Chepstow Gas Company for so kindly placing a room at the disposal of the Institution for the meeting, and for the hospitality they were about to extend to the members. They had already received a genial welcome from the Chairman, and he was sure they would have every reason to remember with pleasure their visit to Chepstow.

The HON. SECRETARY seconded the vote, which was heartily accorded.

This brought the business proceedings to a close.

LUNCHEON.

On the invitation of the Chairman and Directors of the Gas Company, the members then sat down to lunch in the Hotel—the chair being taken by Dr. LAWRENCE. Among other gentlemen who accepted invitations to be present, in addition to the members of the Institution, were Mr. James Price, Mr. S. W. Yockney, M.Inst.C.E. (the Chairman of the local Electric Light Company), and Mr. H. P. Turner (the Chairman of the Lydney Gas Company). The brilliant weather tempted the speakers to be brief, and the short toast list was soon got through. After honouring the Loyal Toast,

Mr. MADDEN proposed "Prosperity to the Town and Trade of Chepstow." He remarked that this was his first visit to the town, and so it was of some of the other members; but from what they had already experienced of it, they all hoped it would not be their last. Chepstow had a history of which it might well be proud. He coupled with the toast the name of Mr. Price, the Chairman of the Urban District Council.

Mr. PRICE, in the course of his response, said that though they had no big industries in the town, there was an iron-works which he believed enjoyed a world-wide reputation for their work. To a great extent they depended on the agricultural district by which they were surrounded.

Alderman CANNING, who proposed "Prosperity to the Chepstow Gas Company," remarked that they had enjoyed thoroughly the welcome of Dr. Lawrence and the hospitality extended to them. Dr. Lawrence's name was known very well not only within the town of Chepstow, but outside it; and during a long and useful life in an arduous profession, he had gained for himself universal esteem. And he was not less to be esteemed for the manner in which he had conducted the affairs of the Gas Company over whose destinies he had presided. In this, he had been assisted by the skill and ability of their good friend Mr. Robb, of whom they were all proud as a member of the Institution, in which he held no second place. Between them they would keep the industry of which the members were the representatives popular in the town. Dr. Lawrence had referred to the longevity of the people of Chepstow, and had told them it was owing to the extraordinary rise of the tide in the Wye, which was probably almost without equal. But he was surprised, and somewhat disappointed, that he had not told them that, at the same time, this longevity was due in a measure to the calorific power of the gas. Good, wholesome, invigorating heat was supplied by the Chepstow gas, and he had no doubt that from this fact 20 to 25 years were added to the life of the people who lived there. [Laughter.] It had been a very pleasant day, and they owed their thanks to those who had made it so. With Dr. Lawrence and Mr. Robb, the success of the Chepstow Gas Company was assured.

Dr. LAWRENCE, replying to the toast, said those present would be glad to hear that, though a small undertaking, the Gas Company was holding its own. He thought as time went on, and people became better educated as to the value of different illuminants, the prospects of gas would be still brighter. Gas greatly assisted ventilation; whereas after sitting in an atmosphere where there was electric light, one felt heavy, head-achy, and dull. This had been observed by the Medical Officers of Health in London, with the result that, as most of those present were aware, they had supplanted electricity by gas. At the recent International Medical Congress, too, the question of ultra-violet rays in light was discussed, and it was decided that electric light was disadvantageous for students, &c. He was firmly convinced that there was a great future for gas.

Mr. HAZELL proposed "The Chairman," whose health was drunk with musical honours; and Dr. LAWRENCE, in the course of his acknowledgment, said he hoped some day to see the Institution again in Chepstow.

THE AFTERNOON.

A stroll from the hotel past the interesting church, to the lower part of the town, soon brought the party to the gas-works, which are so well screened that it is difficult, if not impossible, to find a spot around from which they are visible. The works are naturally small—the annual make of gas being something under 12 million cubic feet; but they are compact, and enjoy the distinction of supplying gas in two counties, Monmouthshire and Gloucestershire. Mr. Robb has occupied his position at Chepstow during the past eight years; and in this time the position of the undertaking has been greatly improved. It is surprising to find that in so small a town there is an Electric Light Company as well as a Gas Company to seek the business of providing the inhabitants with illumination and heat. The latter concern would appear to have been much the more successful in the quest, as the Electricity Company do not seem to pay a dividend, while the Gas Company are distributing the satisfactory return of 7 per cent. to the shareholders. Glancing at some of the back gas balance-sheets, it is noted that in 1906 a dividend of 3 per cent. was paid, and in the same year a large outlay was recommended for new plant. No doubt this new plant has done much to improve the position of the undertaking; but at the same time the demand for gas continues to satisfactorily increase, so that the promise of still further improvement is very bright. As a matter of fact, 1912 was the best year that the Company ever had; and advantage was taken of this to reduce the price of gas 7d. per 1000 cubic feet. The charges now vary from 3s. 9d. up to 4s. 2d. for prepayment and other small consumers; but the bulk of the gas is sold at the former figure.

As to the works themselves, there is little to be said. The two beds of six and one of five retorts were inspected, as well as Mr. Robb's contrivance for overcoming naphthalene troubles. The whole of the tar produced is sold to the County Council for road-spraying purposes; and Mr. Robb is a believer in providing sufficient storage to enable the tar to be disposed of at the time of maximum demand. All lime is used for purification; but that employed contains a large percentage of iron, so that the advantages of both systems combined are enjoyed. The two holders have a total capacity of 62,000 cubic feet.

Brakes were waiting at the works entrance at the conclusion of the inspection; and in these the visitors were taken first over the river, where an excellent view of the Castle was obtained, as well

as a glance at the site of some of the operations in the river bed of Dr. Orville Owen—renowned in connection with the Shakespeare-Bacon controversy.

The river was then re-crossed, and the party were conveyed to the grounds and gardens of Mr. H. A. Tipping, of Mounton and Mathern Palace. Mr. Tipping himself received them, in the warm-hearted manner which they had by this time grown to expect around Chepstow; and under his guidance they saw wonders in the way of rock-gardening, &c. Later the brakes were again requisitioned, and the members returned to the town to take tea on the lawn at Dr. Lawrence's residence—a graceful little attention by the Chairman which fittingly concluded a very happy day.

A UNIQUE COAL-STORAGE PLANT.

A recent issue of the "American Gaslight Journal" contained an illustrated description of some novel coal-storage plant erected for the Indianapolis Light and Heat Company; its novelty consisting in the fact that provision has been made for submerging the coal to prevent spontaneous combustion. The house has a total storage capacity of 30,000 tons; thus providing against coal shortage due to strikes at the mines or on the railroads, and to car shortage on the latter.

The plant consists of a large concrete pit, 300 feet long by 100 feet wide and 28 feet deep. It is 18 feet below the ground level, having a 10-feet wall rising above it. Below the ground the wall slopes at an angle of 45°, which plan was followed with a view to reducing the cost of construction. This results in the pit being 72 feet in width and 272 feet in length on the bottom. The concrete, which is from 12 to 18 inches thick, is reinforced throughout with twisted ½-inch square rods, so as to withstand any pressure from water that may rise in the gravel around the pit.

Through the middle of the pit lengthwise there is a row of concrete piers, placed 15 feet centres, supporting a trestle over which there trails a standard gauge track. A standard 15-ton locomotive crane travels backwards and forwards on this trestle, handling the coal on both sides with a 6-feet coal grab-bucket suspended on a 40-feet boom. The crane and bucket are operated by one man from his stand in the cab, and, being self-propelled and equipped with trucks, couplers, and steam brake, the crane does the switching of the cars off and on the trestle. The coal-cars are run out on the trestle with the crane and dumped; and when coal is required in the power-house, it is loaded into cars by the crane and carried to the boilers.

Forty-pound rails are embedded in the bottom of the pit on 18-inch centres, with half-an-inch of the head standing above the surface of the concrete. When the grab-bucket is working on the bottom of the pit, the rails prevent it from striking the concrete. The pit is filled with water up to the ground level, and holds 13,000 tons. The water is pumped into it by a 4-inch centrifugal pump, taking the supply from the power-house well; the water entering the pit at the ground level. Through the centre of the pit, and beneath the trestle, there is a trough, 12 feet wide and 1 foot deep, which serves for drainage. It is fitted with a drain-pipe carrying the water to either of two manholes, one at each end of the pit. The outlet openings are protected by gratings to prevent any coal from entering the drain-pipe.

The pit was designed by Mr. T. A. Wynne, the Vice-President of the Indiana Company, and was built under his supervision.

Junior Institution of Engineers.

The winter programme of the thirty-third session of the Institution has now been settled. The weekly informal discussion evenings that have been a popular feature during the last two or three years will be recommenced next Friday, when the Vice-Chairman (Mr. W. A. Tookey) will give a lecture on "Gas-Engine Testing." On Monday, the 20th prox., the first ordinary monthly meeting will be held, when a paper by Mr. G. S. Cooper, upon "Modern Coke-Ovens" and embodying notes upon the recovery of sulphate of ammonia, will be read and discussed. The incoming President (Sir Boverton Redwood) will deliver his address on Friday, Dec. 5, and will deal with "The Future of Oil Fuel." Among the papers down for discussion next year is one dealing with the lighting of factories. The numerical strength of the Institution is still steadily progressing. A Local Section, with Manchester for its centre, is now in process of formation.

The new installation of Glover-West vertical retorts at the Bridgwater Gas-Works will be inaugurated next Thursday afternoon by Mr. R. Y. Foley, J.P. The ceremony will take place after an inspection of the plant and works by the visitors, who will subsequently partake of "high tea" on the invitation of Messrs. West.

"A Century of Progress in the Use of Coal Gas" was the subject of a column article in "The Times" yesterday. The writer referred to the exhibition to be opened at Shepherd's Bush to-morrow as "a fitting 'milestone' in the history of gas, as it marks the beginning of its second century in the service of man;" and he added that the programme of conferences and discussions shows clearly "the wide range of utility covered by the use of coal gas."

THE WARRINGTON ESTABLISHMENTS OF THE RICHMOND GAS-STOVE AND METER COMPANY, LTD.

Visit of the Yorkshire Junior Gas Association last Saturday.

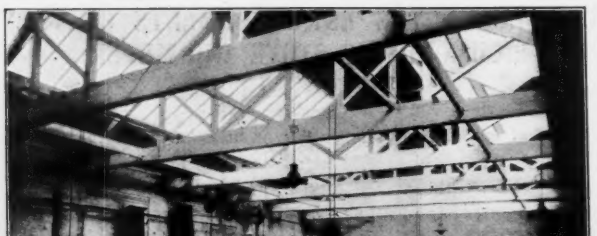
Though the Association dates its year from, and formally opens its session with, the annual meeting in October, this year, owing to the advent of the National Gas Exhibition, and especially as the regular day for the annual meeting has been chosen as the one for the joint visit of the English and Scottish Junior Associations to London, the meeting itself has been deferred to the 8th of November. The interval left between the holiday season and this date was so long that it was thought advisable to put in an extra meeting; so the visit to the Richmond Gas Stove and Meter Company's headquarters, the arrangements for which had been gradually crystallizing during several months, was fixed for last Saturday. The hours of daylight allowed of the inspection going on till six o'clock. Still it needed a large amount of careful planning and excellent organization, not to speak of real "hustling," to get through all that had to be seen at three works, including intervals for speeches of welcome, the taking of photographs, and for refreshments. To reach the works by two o'clock, most members left their towns in the mid-morning; so that, mingled with the expressions of delight in the visit, there were freely expressed recognitions of the kindness shown by engineers, &c., in granting leave of absence to so many, for about fifty members were able to make the journey.

Arriving at Warrington, the members and other visitors were driven to the Grappenhall establishment, the newest works of the Company. The land is very extensive, and immediately adjoins the Ship Canal. No less than seven acres are already covered with up-to-date and specially designed buildings, so arranged that there is ample and convenient room for the storage of the raw materials, and that from the raw material to the finished articles there is a minimum handling of the goods manufactured.

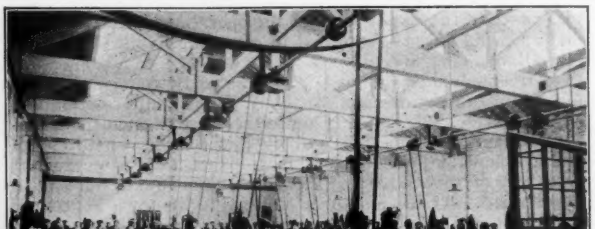
Making their way directly to the men's new dining-hall, the visitors were welcomed by Mr. H. M. Thornton, the Vice-Chairman and Managing-Director. With him were also Mr. Edward Allen, of Liverpool (the President of the Institution of Gas Engineers), Mr. Samuel Glover, of St. Helens, and Mr. T. Banbury Ball, of Rochdale, Professors Harold B. Dixon, J. W. Cobb, and H. M. Dawson, Councillor Kay, the Chairman of the Manchester Gas Committee, Dr. Atkins, a Director of the Richmond Gas Stove and Meter Company, Mr. J. A. Ransome, Managing-Director, and a large number of the officials of the various Warrington and London establishments.

WELCOME TO THE ASSOCIATION.

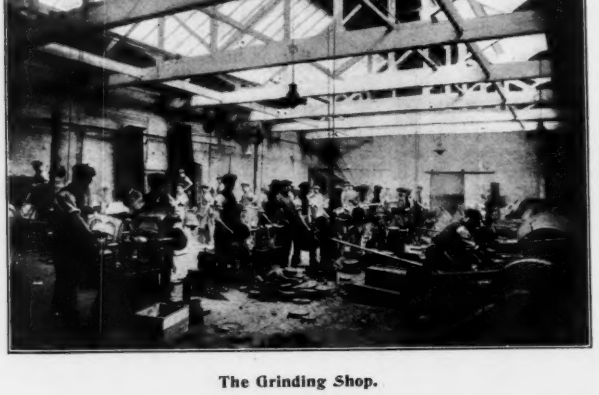
Mr. THORNTON said he offered a very hearty welcome indeed to the Yorkshire Junior Gas Association. Several years ago they had the pleasure of a visit from the Manchester and District Junior Association, and they had since always thought that they should like the Yorkshire members to be their guests. They felt the Association were paying them a very great compliment by coming, the more so because the long journey from the centre of Yorkshire had necessitated many travelling from early morning. He might also say how pleased they were to see with them many other gentlemen associated so closely with the industry to which they all belonged. Mr. Allen, the President of the Institution of Gas Engineers, who also occupied a similar position in connection with the British Commercial Gas Association, had their particular thanks. They knew that his time was now so very fully occupied; and he (Mr. Thornton) also knew it from the close association he had had with him for a considerable time. At present his work was multiplied by the arrangements in connection with the National Gas Exhibition. They had also with them Professor Dixon, of the Manchester University—there also in the capacity of Presideut of the Society of British Gas Industries. They welcomed him very heartily, as they also did Professors Cobb and Dawson (of Leeds). One might well ask what was the object of the Association visiting the Company's works that day; and he should reply that it was their desire to obtain all the information possible for the advancement of their own gas undertaking's interests, and to add to their own store of knowledge in all that concerned gas. Such visits must have the best possible results for all concerned. Co-operation—or perhaps he should say friendly business relations as between the two sides of the gas industry—together with the interchange of thought which must also take place, would give ideas to them both, and enable manufacturers more easily to discover their requirements, and thus to produce the articles which were the most suitable for their purpose. Another reason for the visit, from the point of view of those arranging it, was that it was sometimes impossible, by advertisement or conversation, to convey any good idea of the magnitude of their business, and show that they were in a position to supply the industry at large with any gas-consuming appliance, from a small burner to a furnace capable of doing work of any magnitude. The visitors on their side found a visit worth the time spent, for the useful information obtained in regard to the construction and the general processes of manufacturing the goods they had to supply to their customers. Co-operation that day was particularly marked by the representation of the three great organizations of the gas industry—the Institution of Gas Engineers, the British Commercial Gas Association, and the Society of British Gas Industries—whose heads were present with them. The growth of this friendly business relationship, which had increased very considerably during the past few years, had culminated in the preparations for the National Gas Exhibition which opened next week. The hearty response from both sides of the industry had effected what they would all, when they saw it, regard as one of the most up-to-date of progressive exhibitions they had ever had in connection with gas, and one that must particularly appeal to the gas



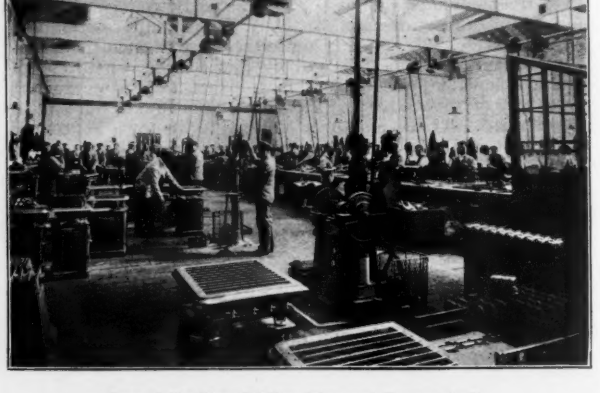
The Grinding Shop.



One of the New Fitting Shops at Crappenhall.



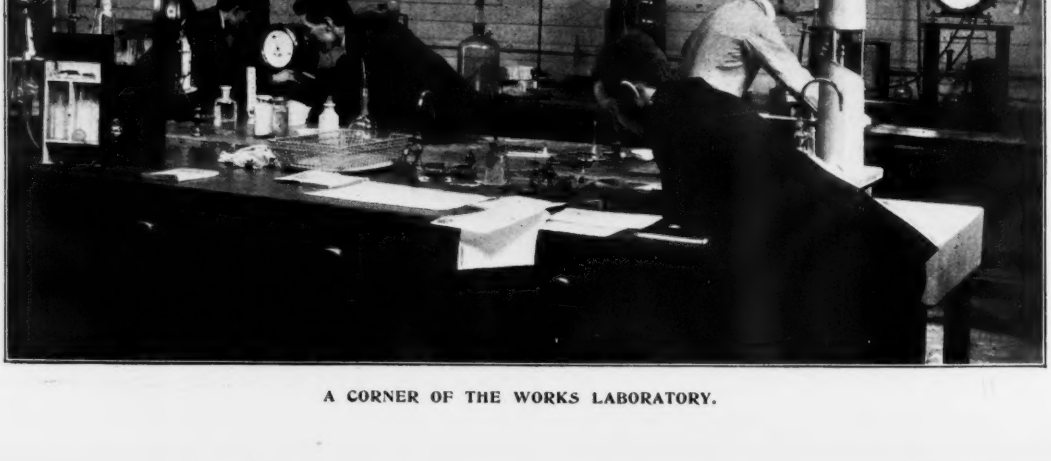
The Gas-Furnace Erecting Department.



The Enamelling Department.

consumer. As Vice-Chairman of its Executive Committee, and in that capacity representing the manufacturers, he knew how heartily both sides had worked together, not only in subscribing large sums of money, but also in carrying out the project, and in the splendid way generally in which the manufacturers had responded to all the calls made upon them. The time at his disposal was too limited for him to say all that he should desire on such an occasion; but he hoped the visit of the Association would result in the members deriving knowledge that would be useful to them. Again, on behalf of his Company, he heartily expressed his pleasure in their acceptance of the invitation extended to them.

Mr. EDWARD ALLEN said he very much appreciated the kind words with which Mr. Thornton had welcomed not only the Association but himself. Mr. Thornton had spoken of the duties of his presidential office; but he wished them to know that, though a duty, he regarded his share in that day's visit also as a great privilege. He was glad to be there with Mr. Thornton and his excellent staff, and once again to see the work going on in the foundry and workshops. He was familiar with the Richmond works from their association with his own Company; and he was glad to know that such a fine organization existed for the advantage of the whole gas industry. Mr. Thornton had referred to the association of the industry with the Institution of Gas Engineers. There was no happier feature of late years than the desire for co-operation—he might even say federation—between the two sides of the great gas industry. The Institution might be spoken of as the originator of this satisfactory state of affairs, and, in the outcome, the British Commercial Gas Association was formed with the intention of promoting both their interests. What he was looking forward to was the intimate connection in one big federation of their three great organizations, not for one or two, but for all purposes. He was especially glad that they had in the British Commercial Gas Association the inestimable advantage of the intimate assistance of such representatives of the management of great gas undertakings as Bailie Paxton, of Glasgow, and Councillor Kay, of Manchester. He much appreciated their presence



A CORNER OF THE WORKS LABORATORY.

there. They had sacrificed time and leisure, because they hungered for information and professional intercourse. Many problems might be solved in the train; and they might thus go home that day, as he had often done, much helped and encouraged by free contact and conversation with fellow-members. In the gas industry there was plenty of room at the top; and though juniors might be said to be at some distance from the top, yet out of juniors must all seniors be made. He was sure Professor Dixon would agree with him when he advised that they should not only get all possible information and do their best in their practical labours, but that they should have their capabilities "stamped" by obtaining diplomas and certificates, by which members of a committee or directors of a board would know when there was a good candidate before them. These diplomas would inspire an initial confidence in them. There was, as he had said, plenty of room at the top. But they must all work; and he trusted that the facilities offered at Manchester, Leeds, and other places would be taken full advantage of by the juniors, and that the coming seniors would be highly qualified to carry on the work of their great industry.

Professor DIXON protested that he could not give the visitors another lecture, after the admirable one they had just listened to from Mr. Allen, who had told them some great home truths; and he (the speaker) could but endorse his words. If it was part of Mr. Allen's duty to be there that day, it was also a part of his, as President of the Society of British Gas Industries. After having long been advocating gas-fires, he had, in connection with recent household rearrangements, ordered a number of extra stoves. At the time he was told they were on order and expected daily. This went on for about seven weeks. At a London meeting he happened to tell the Society this from the presidential chair, and to emphasize the need not only of such co-operation as they often spoke of between gas engineers and the manufacturers, but co-operation with a third section, the public—their customers and gas consumers. He noticed that a number of pencils soon became busy, but attached no special importance to it. On reaching home some time later, he found he could hardly get into the hall for the cases of gas-stoves that had poured in upon him. He agreed with Mr. Allen's dictum of the room there always was on top; and he was accustomed to tell his students that, if they would but aim high, and stick at it, embracing all opportunities that came along, they could rise to anything—a professorship or the head of a great business organization. He was pleased to see his Yorkshire friends. He was glad they had such fine opportunities in connection with the Leeds University; and he congratulated them. He wished that Manchester had the same; but he had done his best for the gas juniors of their county. He had invited them to share as fully as they could in all the University provided; and he had arranged special lectures for them. His other obligation to be there that day was that he too with them might learn. Even if they did eventually get to the top, they would still need to search and to learn.

Councillor KAY, the Chairman of the Manchester Gas Committee, emphasized one of Professor Dixon's remarks, and said that, if one meant to succeed at all in this busy world, he must be somebody and of some reputation. Everyone might have chances of rising near the top. Many of the most striking successes he knew were examples of specialization; and the specialization which was the secret of success was largely, he held, sticking to one's work, and thoroughly mastering all its details. He was sure the visit would result in good. It would increase their knowledge; and many of them were just the means by which the longed-for co-operation between gas suppliers and apparatus makers on the one side and the general public on the other could be established. They were the intermediaries; and it was by their fuller equipment and their more intimate knowledge of gas appliances and their possibilities that better mutual feelings, and consequently better trade, would ensue. In these stirring and rather distressful times in the industrial world, it was pleasant to see the plainly satisfactory relations existing between the Richmond Company and their employees. Their cheerful continuance at work on that fine Saturday afternoon was more than a mere wage payment would account for.

Mr. SAMUEL GLOVER expressed his pleasure in having been given the chance of meeting his Yorkshire friends on the visit; and he was glad they had come to have illustrated to them the production of gas-stoves in the very best possible way. The works upon which they now were represented the consummation of ideas and plans that had long been revolved in the minds of their friends the hosts. Having watched and criticized their work and development from its first beginnings, he was glad to find they had progressed so much as to have such works for the visitors to see as they that day would.

Mr. T. BANBURY BALL also spoke of his recollections of the early days of the Richmond Company, and expressed the pleasure he had had in seeing its well-merited development.

Professor COBB said he was pleased to meet the members for the first time formally and by themselves as the Yorkshire Junior Association. He was sure they would profit by the great privilege of seeing, as they would do, so busy and interesting a hive of industry in full swing. In pursuing the great aim now looming before them all of making the use of gas for heating more general than heating by coal, progress must be seen along two lines. First the gas engineers must realize that they must find out how to produce a suitable gas at such lower prices than present ones as to enable it easily to supplant coal in fires; and, secondly, the manufacturers must investigate the conditions leading to economy and efficiency of gas-using appliances. Much of the success of the industry depended on these two things; and he had good reasons for expecting to be more than satisfied in the near future. The Richmond Company had laid the foundations of their work well in this respect, and had been fortunate in their chemists.

Dr. ADKINS having added a few words of welcome to the Association and good wishes,

Mr. W. WALKER ATLEY, the President of the Association, briefly expressed the visitors' thanks for the invitation sent them, the welcome now extended, and the evident promise of great pleasure and profit during the afternoon.

Mr. J. A. RANSOME, Managing-Director, briefly outlined the order of the proceedings, and assured the company of the workpeople's willing co-operation in making a Saturday afternoon visit possible. He pointed out, however, that they would see the works without boys, as none under eighteen years of age could legally be retained at work. With this one exception, they would see everything in full and usual working order.

On the conclusion of the speech-making, the whole company adjourned and were photographed on a part of the land facing the Ship Canal.

INSPECTION OF THE WORKS.

The inspection of the works now began, and from the first was evident what became increasingly apparent as the afternoon wore on—namely, how much thought and work had been devoted to the arrangements for the smooth and speedy seeing of the maximum in the minimum of time. The visit, like the works and the business arrangements, was a triumph of organization. The stacks of the various special brands of pig iron necessary for enabling the Company to get the right mixtures for suitable castings for their classes and grades of work, and the bins of moulding sands and foundry coke-stores, were first seen; and then the gas-power house, where two 68 H.P. engines were working, supplying the air compressors for water lifting, &c., providing the air blast for the iron-melting cupolas, &c. Unable to spend any time in watching the details of cupola working, the visitors made their way to the large foundry, about 400 ft. by 380 ft., where a considerable number of moulds, all in position for receiving metal, were seen, with the bogeys containing molten metal being transferred to small ladles. The moulds were for casting *souvenirs* of the occasion, and each visitor was invited to cast his own.

The cupola actually at work was capable of melting 12 tons of metal per hour. When tapped, the molten metal runs into large ladles, each holding 1 ton, suspended from the overhead runway. They can thus quickly, and with a minimum of labour or heat annoyance, be carried to any part of the foundry. Here the metal is transferred to small working hand-ladles, and each man casts the boxes he himself has moulded. The size of the foundry—all under one roof, and visible at once—impressed the visitors, and they tried to imagine what the yearly output of upwards of 80,000 fires, cookers, and radiators (besides side lines, and furnaces) would look like if all collected. Across the foundry was seen the water-pumping station. Water for the whole of the works is pumped from a well 150 feet deep to an overhead tank by means of compressed air, the compressor being worked by town gas.

Conveniently situated alongside the foundry are the working pattern stores. While new articles may be made from a "loose" pattern—a temporary or plaster one—so soon as a settled demand for an article is manifested an exactly accurate and highly-finished master pattern of iron is prepared. From this, working patterns of iron are made and used in the foundry. All master patterns are kept at the Academy Street works, but the working patterns here. Thousands of pounds' worth of these patterns were seen. Of cookers alone some 138 patterns were in stock, many of them, of course, being simply special modifications of standard types insisted upon by individual purchasers. The core shop was now visited, where a considerable number of girls were at work making the cores for various burner tubes. The ovens where these are dried were seen, and some of the moulds with cores in position were on view in the adjoining foundry.

Following the course of the manufactured article, the dressing shop was entered, where the castings are cleaned, any clinging sand brushed off, and all roughness removed. The goods then pass into the examining and testing shop. Every casting is here examined by expert men, who assure themselves that the castings are sound and of sufficiently high standard to be passed into the stores. In one corner of the shop all burner-tubes for cookers are, before drilling, tested under a high pressure of compressed air, to see if the whole pipe is sound and non-porous.

From the dressing-shop right across to the stores, and to every part of them, is an overhead runway; and loads of miscellaneous castings were seen being distributed into their respective bins. The system adopted was carefully explained and as carefully followed. Less familiar than bins of taps and other brass fittings were the enamel stores. The actual enamelling is done at one of the other works, and was witnessed later in the afternoon. The full range of enamelled sheets was seen, and their pure surface, colour, and lustre, were greatly admired.

Passing the burner-tube drilling-shop, the grinding and polishing shops were visited, where the full staff were at work with their large wheels grinding the flat castings, also glazing and polishing such specialities as the "Armorbrite" series of stoves. The visitors were much impressed with this room, and the precautions adopted, in its original design and equipment, to minimize risk of accident and dust dangers. No two rows of workmen face each other, being back to back; no shafting or belts are exposed, all wheels being under-driven, and provided also with air-shafts, along which, by means of a powerful fan, the bulk of the dust is conveyed to a settling chamber. Below the floor are two 7 ft. by 6 ft. tunnels, in which all shafting is placed. A 63 B.H.P. gas-engine supplies the power for the grinding and the fitting shop. All the six drives are in parallel from one shaft, and can be independent and thrown out of action. One of the fitting-shops was inspected, and it was noticed that each machine was provided with an automatic stop, so that power was not wasted by any man leaving a machine running, nor was any of his time occupied by stopping it. The three shops represented three grades of qualities of goods, and were worked in ascending order by boys under 18, lads between this age and 21, and journeymen.

As the goods are here fitted up, they are passed to the testing-shop, where every separate appliance, from the cheapest pattern of a boiling-ring to the largest apparatus made, is tested by expert workmen with gas at a standard pressure, so that every article passing out as finished is known to be sound and correct.

Still following the works' travel of the goods, the blacking and japanning shops were entered. The various dipping and painting processes were watched and the ovens examined; these being not only explained, but opened, and some of the goods within withdrawn for temporary inspection. Keeping the ovens up to a temperature of 450° Fahr., it is possible to pass through them some 400 cookers a day; the stoving of the parts that are simply black-dipped being done at night, so as to minimize any annoyance to workpeople from smells given off. In the packing and despatch rooms, a collection of typical ranges of fires, radiators, water-heaters, &c., had been arranged, particularly of the newly introduced patterns and varieties.

Re-entering the vehicles in waiting, the party were conveyed to the older works at Academy Street. As time, and possibly also bodily strength and mental freshness, was lacking to go systematically through the rooms, only four departments were taken.

In the pattern-making and filing shops were shown the steps by which the working patterns seen at Grappenhall were prepared. First of all, a plaster mould is made, and from this one of tin, on which material all care in exact measurement and high finish can be expended. From this a master pattern in iron is made, and again finished as perfectly as possible, so as to secure a continuance of good mouldings, and then finally the working pattern. Examples of all these stages were shown. Special attention was attracted by the copious supply of full-sized working drawings hanging around on walls, &c.

The gas-furnace shop was now visited; and as many of the members had seen the striking show of low-pressure Richmond gas-furnaces on their visit to the Sheffield furnace laboratory,* this had been awaited with some degree of quickened interest. A strikingly concise and helpful description was given by the head of the department. The development of low-pressure gas-furnaces with natural draught or with air blast is one of the special features of the Company's work; and what they are doing with it in Sheffield—aided by gas at 1s. per 1000 cubic feet—is being watched with keen interest by the metal trades. At present judgment is deferred as to the relative merits of the rival methods of low-pressure gas-furnaces at Sheffield and high-pressure ones at Birmingham, though, of course, the great difference in price of the two gases is a vital factor. At Sheffield, steel can be annealed for 4s. per ton; the process being quicker than with coal, and no "coffins" for enclosing the bars of steel are needed with the gas-furnaces. These furnaces are being made in all sizes up to 20 feet; and their importance to the gas undertaking can be summarized by saying that the daily gas consumption of some single furnaces will be equal to that of a row of cottage property. The furnaces have a remarkably high efficiency; and the great feature of many of them is that they work with natural draught, and with gas at only 2 inches pressure. Under these conditions, they can attain a temperature of over 1300° C., and are probably the only ones sold with any guarantee beyond 1100° C. (under such conditions). With an air blast, they could maintain 1800° C. in a furnace.

The testing and experimental shops, and the laboratories, were somewhat hurriedly glanced at; and then a demonstration was given by Mr. H. Hartley, M.Sc., the Company's Chief Chemist, on the Leeds method of testing the radiation efficiency of gas-fires. The construction and arrangement of the experimental room were explained, and various ingenious devices for simplifying tests and running simultaneous ones shown. A few of those present had the privilege of seeing a small accessory laboratory—interesting as being one of the rooms of the house actually occupied by Priestley, the discoverer of oxygen, and thus the founder of modern chemistry. It was the more interesting to Yorkshire visitors, as they have in their midst Birstall, his birthplace, and Leeds, the scene of his greatest discoveries, where also in the University is treasured some of his original apparatus.

Leaving these works, the visitors next reached the enamelling works. This was probably the most novel and unfamiliar sight of the day. The work done consists of the application and fusing of the patent "Porcellanite" enamel on steel sheets (for cookers) and cast iron (for stoves). The raw materials were seen being ground, mixed, and fused. The molten vitreous enamel ran into water; and the cooled material was then ground into a paste with water. Workmen were next seen dipping the goods into enamel, drying them; and the short process of fusing the enamel in a muffle furnace was carried right through. The modification and repetition of this process for colour work, name stencilling, &c., was also seen. Cast-iron stoves were being heated to redness in a muffle, the dry enamel powdered on, and then the stove returned to the furnace for a few minutes to fuse the enamel. This part was somewhat hurried over; but it lent itself to speedy inspection.

HOSPITALITY OF THE COMPANY.

At the close of the inspection, the visitors assembled at the Patten Arms Hotel, where tea was served. Over this gathering Mr. Ransome presided. Replying subsequently to a very cordial vote of thanks from the Association to the Richmond Company and the officials who had taken part in the arrangements for the visit, he said that they had seen much, but by no means all either that they could have shown or would have liked to have shown the visitors. They had obtained a very fair general idea of the enormous variety of processes and considerations to be borne in mind in stove making; and, if so impressed, the visitors had gained much of what was desired to accomplish by the visit. At first the officials had been a little curious as to how all would pass off. But any misgivings were soon allayed; and on their side they also had found the visit pleasant. They thanked their visitors for the evident appreciation of the efforts put forth on their behalf, for their obedient acquiescence in the programme as sketched out, and for their goodness in coming so far in acceptance of the Company's invitation.

* See "JOURNAL" for June 14, 1913, p. 816.

London and Southern District Junior Gas Association.

The opening meeting of the Association for the 1913-14 session will take place at the Westminster Technical Institute on Oct. 10, when there will be addresses by Mr. D. Milne Watson (the General Manager of the Gaslight and Coke Company) and Mr. S A. Carpenter (the President of the Association). This will be followed, on the 18th, by the joint visit of the English and Scottish Junior Associations to the National Gas Exhibition. Subsequent fixtures are as follows: Nov. 8, visit to the Birmingham works of Messrs. John Wright and Co. Nov. 21, paper by Mr. F. S. Larkin, entitled "Notes on Gas-Stove Construction." Nov. 29, visit to the Chingford reservoirs of the Metropolitan Water Board, to inspect the installation of Humphrey gas-pumps. Dec. 12, an address by Mr. Charles Carpenter, D.Sc. Jan. 10, 1914, visit to the Southall works of the Brentford Gas Company. Jan. 23, paper by Mr. J. G. Clark, on "Eddies—Some Observations on the Motion of Fluids in their Relation to Gas Appliances." Feb. 7, visit to the Sydenham works of the South Suburban Gas Company. Feb. 20, paper by Mr. George Keith, entitled, "Recent Developments in High-Pressure Lighting." On Feb. 28, there will be the annual dinner. March 14, visit to the Stepney works of the Commercial Gas Company, to inspect the gas-furnace laboratory, &c. March 27, paper by Mr. F. Pearce, on the "Construction of a Retort-House." April 18, visit to the works of the North Middlesex Gas Company. An informal, short-paper meeting will be held on April 24; while on May 22 there will be the annual general business meeting. The final item on the programme is a summer meeting on June 6, which will take the form of a visit to Luton, to inspect the works of the Davis Gas-Stove Company. Special attention is drawn to two series of lectures at the Institute during the session, by Dr. Rudolf Lessing on "Refractory Materials," and by Mr. L. F. Tooth on "Gaseous Combustion and Furnace Heating."

The Training of Chemists.

In concluding his Presidential Address to the Chemical Section of the British Association, Professor W. P. Wynne remarked that once again the cry had been raised in the Press that chemists trained in the universities were of little value in any industrial pursuits. It was said that they were too academic, and that they were not worth their wage—little as that often was, whether judged by a labourer's hire or the cost of a university training. It might be so; but, on the other hand, it was possible the employer obtained all that he paid for, and by paying more would receive in return much more, by the inducement offered to more highly trained men to enter the field. Three years' training for the ordinary degree could not carry a student very far in chemistry; and this preliminary training—for it was little more—was insufficient to equip the young graduate for more than routine work. With the honours student it was otherwise. More highly equipped in the academic sense than a man who had worked only for the ordinary degree, he undoubtedly was; yet there was seldom time to begin his training in research methods or in methods of commercial analysis where rapidity rather than extreme accuracy was the object in view. Two reforms, he ventured to think, were needed. The first would avoid early specialization, which was apt to be disastrous; and the second would encourage post-graduate training in directions where the student's inclinations or aptitude might be stimulated and developed. If the civic universities could come to some agreement requiring three years' residence, subsequent to the intermediate, for an honours degree in chemistry, the first reform would be effected. If, further, they could see their way to standardize their ordinances and regulations for the M.Sc. degree, cease to confer it on honours graduates of one or more years' seniority in return for the payment of a fee, and confine it to graduates—not necessarily honours graduates—who had carried out an approved piece of research during not less than one academic year, selection committees, &c., would have some clue to the type of man before them. He would go further, and suggest that the interchange of honours graduates between the civic universities, or between them and other universities or colleges, if it could be arranged, would be of much benefit to the student himself. Whether or not these suggestions were practicable, there could be no doubt that the urgent need of the present time was the provision of scholarships and exhibitions sufficient in value to secure at least a bare livelihood for post-graduate work.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Alliance and Dublin Gas Company.

SIR,—I have only just returned from a long holiday, and therefore have not had sufficient time to consider the accounts of the above-named Company for the half year ended the 30th of June last, but only very recently issued. I am, however, gratified to notice, by the copy of a circular letter received this morning,* that I have at last secured an ally in the campaign against this disappointing Company. If the author of the letter (Mr. F. J. Dickens) can penetrate the placid and smug attitude of the Directors, and thereby awaken them to the unsatisfactory state of the Company's affairs, he will do some good service for the stockholders; otherwise, failing immediate and radical improvement, there is no other course open but for the stockholders to appoint a Special Committee of Investigation, with plenary powers, to examine the concern root and branch, and make recommendations as to its future policy and direction.

Judging from the half-year's accounts to hand, there appears abundance of evidence justifying the attitude and criticism that I have displayed and levelled against the management of the Company. What do we find at the present moment?

(*a*) The market price of the "A" and "D" gas 5 per cent. consolidated stock marked 60 to 65 per cent. *cum div.* (Sept. 24)—a clear loss of £350,000 to the stockholders, assuming the value should be as low as par.
(*b*) Standard dividend of 5 per cent. reduced to 4 per cent.
(*c*) Reduced sale of gas for the half year of 25 millions.
(*d*) A debit balance against capital of £58,410.
(*e*) An overdraft of £50,347 from bankers.
(*f*) A proposal to increase the price of gas from 3s. 4d. to 3s. 6d.

Many of these points have been touched on by me in the past; and I do not propose to trespass on your space by going into further detail until I find what effect Mr. Dickens's proposal is going to have.

My personal view (based on thirty years' experience) is that this Company should in five years, with efficient control, be in a position to sell gas to the ordinary consumers in the City area at 2s. 6d. per 1000 cubic feet. This would be a boon to the consumers, who would undoubtedly show their appreciation by using more gas; for at 3s. 4d. and 3s. 6d. the use for lighting is bound to be restricted, and for other purposes, such as cooking and heating, regarded as a luxury for those only of ample means. Then the long-suffering and patient stockholders would be entitled to an increased dividend to £6 2s. 6d. per cent., which would be doubly welcome, as it would not only be acceptable as additional revenue, but raise the value of the stock well above par. In future, with the reorganization of this concern (which is inevitable), I trust it will be a *sine quâ non* that, as the price of gas is reduced, the stockholder receives the full statutory dividend; otherwise it cannot be regarded in the light of the true spirit which originally influenced the sliding-scale.

Let me quote you an instance exhibiting the total indifference of the Directors to the stockholders. In a letter to you dated March 26, 1913, I stated that in the accounts for the half year ended Dec. 31, 1912, the total gas sold showed an increase of 11,105,000 cubic feet over the corresponding period of 1911, but that the gas revenue for the 1912 period showed, instead of an increase, a reduction of £2783 14s. 4d., and this with the price of gas the same in the two half years in question. This point, and others in my letter, were very kindly transmitted by you to the Chairman of the Company in time for him to explain at the meeting of stockholders held on the 31st of March. Instead of graciously acknowledging your courtesy, he coldly passed the communication without any reference. No wonder British stockholders are sick of this undertaking, and wish they had never bought a pound's worth of stock. But, as we are in, it is manifestly our duty to see that the concern is run on sound lines.

I enclose you Mr. Dickens's circular-letter, and congratulate him on the bold step he has taken. I trust he will now follow the matter to the bitter end.

Sept. 27, 1913. NONULUS.

Electrically-Caused Fires.

SIR,—In view of the capital which the electrical papers are endeavouring to make out of the Aisgill disaster, the enclosed cutting from the "Sunderland Daily Echo" of the 26th inst., referring to a fire in a Sunderland electric tramcar, may be of interest to your readers.

Sunderland Gas Company, Sept. 27, 1913. CHAS. DRU DRURY.

[ENCLOSURE.]

Fire on a Tramcar.

A slight fire occurred on a tramcar proceeding up Chester Road about half-past six last night, causing some alarm among the passengers The fusing of the electric light wires caused the outbreak; but very little damage was done to the car, and none of the passengers were hurt. By the use of sand, the fire was quickly extinguished, and the disabled car was, with the aid of another tram, taken to the sheds.

Wayleave for Gas-Pipes.—A correspondent of an authorized gas undertaking in the Midlands some few years since laid a main outside the statutory limits along the public highway to a village three miles away, having first obtained the consent of the road authority. On the way, the main runs through another parish, where a person has since purchased an estate adjoining the highway in question, He now demands a yearly sum of £10 as rent for the ground occupied by the main along his frontage. Our correspondent is wishful to learn whether any other gas company has met with a like experience, as, if so, it would be a guide to him in dealing with the matter mentioned above. Perhaps readers would favour us with their views on the subject.

* This is reproduced on another page.—ED. G.L.

REGISTER OF PATENTS.

Inverted Incandescent Gas-Lamps.

THOMPSON, W. P.; a communication from the General Gas Light Company, of Kalamazoo, U.S.A.

No. 19,207; Aug. 22, 1912.

This gas-lamp is of the type in which a casing encloses a space around the chimney, and the mixing tube is sheltered from the heated products of combustion, which are led up into chimney flues arranged around it by means of a deflector plate. It consists in certain novel arrangements and combinations of parts (not described apart from the detail drawings), in which the mixing tube is arranged horizontally. The lamp is adapted for use with varying grades or qualities of gas—that is, rich or weak gas, and under differing pressures. It has been found in practice, the patentees say, that many gas-lamps of the inverted burner type, which would operate with one quality or pressure of gas satisfactorily, are not adapted for gas of another quality or other pressure. The present lamp, as stated, operates satisfactorily under varying conditions without readjustment; and further, it is not likely to back-fire on lighting, or to explode on cutting-off the gas supply.

Two allied patents were redated from 1912 to No. 6454 (March 15) and No. 8456 (April 10) of 1913; and these relate to further minor structural alterations in the mixing arrangements of the burners.

Extraction of Ammonia and Sulphur Compounds from Gas.

COBB, J. W., of Leeds.

No. 13,141; June 4, 1912.

This invention relates to a process for the simultaneous extraction of ammonia and sulphur compounds from the gaseous products of the distillation or semi-combustion of coal or other carbonaceous material in retorts, coke-ovens, gas-producers, blast-furnaces, and the like, and the preparation of ammonium sulphate from the ammonia and sulphur compounds so extracted.

The invention has particular reference to a process of the kind in which the gases are washed with solutions or suspensions of compounds of metals, and in which the sulphides formed from them are filtered off, and ammonium salts recovered from the filtrate.

The patentee remarks that numerous attempts have been made to carry out this process—mostly with imperfect results—and to utilize its products, such as by calcining or roasting the metallic sulphides formed therein with the view of converting their sulphur content into sulphur dioxide, treating such sulphides in suspension with sulphur dioxide and air, to regenerate the sulphates and the thionates; or calcining carefully at a low temperature the sulphides of copper, lead, magnesium, zinc, or other metals precipitated by the gases to obtain sulphates to be used again in solution to treat fresh quantities of gas. In the last case, it is very difficult to oxidize zinc sulphide into zinc sulphate, without losing appreciable quantities of sulphur. The conversion into sulphate is never complete; and "the product which remains is unsuitable for the treatment of gases." Another attempt has consisted in treating the zinc sulphide resulting from such a process with sulphuric acid, burning the sulphuretted hydrogen evolved, transforming the sulphur dioxide so formed to sulphuric acid, and using the zinc sulphate over again in the treatment of the gases. This process, however, "besides being very tedious, has the drawback that tar, which it is impossible to remove from the gases, is not destroyed during the process and interferes with the reaction; moreover, the use of acid necessitates the employment of lead-lined vessels."

The present invention aims at overcoming the disadvantages of the prior processes, and "obtaining, by means of a comparatively small plant, a large output and economical working."

The gas is washed in known manner with the solution of the metallic sulphate, from which sulphuretted hydrogen will precipitate the corresponding sulphide in neutral or alkaline solution, the sulphide is filtered off, and ammonium sulphate is recovered from the filtrate. The sulphide so obtained is then roasted under such conditions that the resulting calcined product is in the best form for combining with sulphurous acid and oxygen to form metallic sulphate—the sulphurous gases formed being suitably collected. The residue from the roasting, or the portion therein insoluble in water, is suspended in water through which sulphurous gases from another roasting are passed. Air is also blown through the liquid; and in this manner metallic sulphate is regenerated and is again used for further treatment. It will be seen that the regeneration of the metallic sulphate is effected in such a manner that it is free from deleterious tar contamination.

Describing the process in greater detail, the patentee says: A solution of zinc sulphate is suitable. The liquor resulting after washing the gas is filtered, when the ammonia of the gas is obtained in the filtrate as ammonium sulphate, and the corresponding sulphur in the precipitate along with the zinc. The filtrate is evaporated to recover the ammonium sulphate in crystals. The precipitate is roasted in a controlled current of air. A proportion, but not the whole, of the residue is sulphate; and some gaseous products of the roasting, including sulphur oxides, are evolved. The solid residue, or the portion insoluble in water (to which the solid residue from one or more previous roastings may be added) is then suspended in water. The roasting gases from the same or another roasting are passed through this suspension, and absorption of the sulphurous gases results. Any sulphurous gases escaping from the suspension may be re-circulated by turning them into the air supply of the roaster in which the zinc sulphide is roasted. Passage of air through the suspension may be continued after the evolution of the sulphurous gases from the roasting has ceased, so as to further oxidation and solution.

The suspension resulting from the absorption of sulphurous gases is allowed to settle or is filtered. The filtrate contains zinc sulphate, which is used again for washing the gas. Thus the sulphur of the gas

is obtained successively as zinc sulphide, zinc sulphate, and ammonium sulphate. The solid residue from the absorbing suspension is used again in the absorbing process.

It is said to be advisable that the roasting should be done at a controlled low temperature—about 500° C. being suitable. This temperature is high enough to destroy the tar in the product to be calcined or so to alter it in character by volatilization, some combustion, and carbonization, that it is no longer detrimental to the success of the process. It is advisable also to keep the absorbing suspension warm. About 80° is suitable.

The process may also be carried out with such sulphates, other than zinc sulphate, as allow of effective precipitation, roasting, and absorption as described.

If more sulphuretted hydrogen is present in the gas than is equivalent to the ammonia present, it will remain there after washing with the sulphate solution as described. It can be removed by various methods—such as that of absorption by a suspension of lead sulphate; but no claim to this method of recovery is made.

Generating Carburetted Water Gas.

STEPHENSON, J., of Salisbury, and FIRTH BLAKELEY, SONS, AND CO., LTD., of Dewsbury.

No. 26,916; Nov. 22, 1912.

This invention is an improvement on the apparatus described in patent No. 6849 of 1911—relating to the control of valves and feeding devices.

Fuel is supplied to the generator from the hopper A by means of the revolving feeding device B, which delivers a measured charge of coke into the chamber C at fixed intervals. A valve is provided which allows the chamber to communicate with the generator for a quarter of a minute in each ten minutes. This valve is actuated by mutilated gearing from the shaft D. Air is blown into the generator through the pipe E and the rotating valve F which is actuated by gearing. The valve rotates once in ten minutes, and is open for three minutes. The valve G is similar to F, except that it opens and shuts ten seconds later. Thus air is blown in through the generator, the pipe H, the valve I (which rotates synchronously with the valve F and is open for the same time), and the pipe J into the carburettor. Ten seconds later the air passes through the valve G into the carburettor through a pipe opening at K. Thus carbon monoxide and air meet at the top of the carburettor. The gases pass on to the superheater, air being admitted at the bottom of the superheater at L. The burnt gases pass through the valve M (actuated by gearing from the shaft D synchronously with valves F and I).

The gas-making period now begins—to last for seven minutes. Steam is admitted through the pipe N and the valve O, which rotates once in thirty minutes, and is so constructed that it is open for the last seven of each ten minutes. The steam blows twice from the bottom of the generator passing through the pipe P, and once from the top of the generator through the pipe Q. The escape of the water gas from the generator is controlled by the valve R which is synchronous with the valve O. While steam is blowing from the bottom of the generator, the water gas passes through the pipe H and through the valve to the pipe S. While steam is blowing from the top of the generator, water gas passes through the valve R and the pipe S. Thus in any case for the last seven out of ten minutes water gas is passing through this pipe. It then passes through the pipe J to the carburettor. Oil is led through a coil T, heated by the gases passing off through U. A valve V which is open for the last seven of each ten minutes is actuated by gearing from the shaft D, and this valve allows the inflow of oil to meet a current of water gas drawn by a pump from the bye-pass W so as to be sprayed into the carburettor. The carburetted gas passes to the super-heater, and is led off through the pipe U.

The sequence of operations then "begins as before, and the process is thus carried on entirely automatically."

Combustion of Gaseous Fuels.

M'COURT, C. D., of Streatham Common, RADIANT-HEATING, LIMITED, of Victoria Street, Westminster, and SCHNABEL, R., of Berlin.

No. 19,490; Aug. 26, 1912. No. 5114; Feb. 28, 1913.

This combined invention has reference to the combustion of an explosive mixture in a flameless and continuous manner—*i.e.*, non-explosively—and further has relation to the combustion of an explosive mixture consisting of fuel (such, for example, as coke-oven gas, blast-furnace gas, producer gas, coal gas, natural gas, oil, or the like) and air as described in patents No. 25,808 and No. 29,430 of 1909—that is to say, by utilizing the accelerating influence of an incandescent solid upon gaseous combustion in such a way as to enable a large proportion of the heat of combustion to be utilized at a high temperature in a variety of ways in industrial and laboratory operations—the constituents of the explosive mixture of coal gas and air being present therein in the proportions theoretically necessary for full and complete combustion of the fuel, and the mixture being delivered at a speed greater than the rate of propagation of combustion through the mixture to a body or bed in or on which combustion takes place.

Further, the invention has relation (in particular but not exclusively) to the process of combustion as described in patent No. 4362 of 1910. Here combustion of a mixture of fuel and air in the proportions theoretically necessary for full and complete combustion of the fuel is effected in, on, or among a bed or beds of refractory material in granular or fragmentary condition, packed or charged in a tube or in tubes traversing a liquid to be heated; the mixture being delivered to the beds under a pressure such that the resistance offered by the refractory material to the flow of the explosive mixture in it or through it is overcome, and the mixture is delivered at a speed greater than the rate of propagation of combustion through the mixture.

One of the objects of the invention is to enable the explosive mixture to be delivered, in a combustion bed as defined, to the body of refractory material in, on, or among which combustion is effected, at a speed less than the speed of propagation of combustion through the mixture, without the risk of back-firing. It also has for its object to prevent or minimize the risk of back-firing, by preventing or reducing conduction of heat from the body of refractory material to the mixture supply chamber through the member connecting the mixture supply chamber and body of refractory material, and dissipating the heat absorbed by the member. Another object of this invention is to provide more efficient means for use in connection with the process of combustion referred to, "and which shall be adaptable and usable in a variety of ways in industrial and laboratory operations, and shall be convenient in practice"

The specification then describes in great detail, by the aid of lettered drawings, how the various plants are to be constructed and operated.

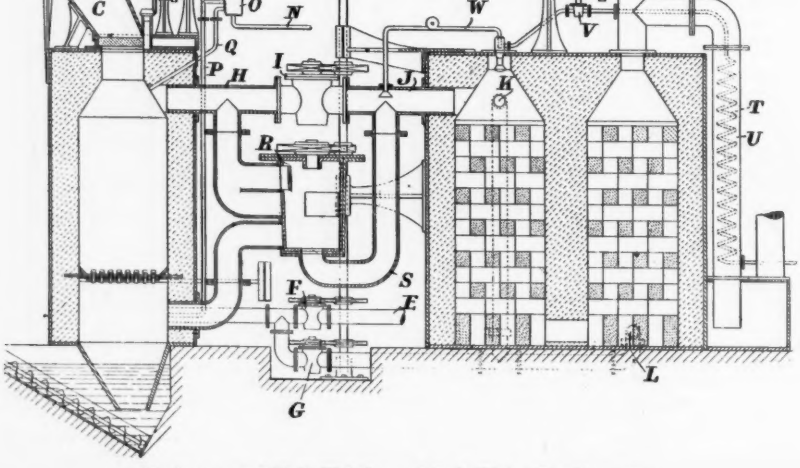
Governor for Gas, Air, &c.

MILNE, J. R., and COWAN, J., of Edinburgh.

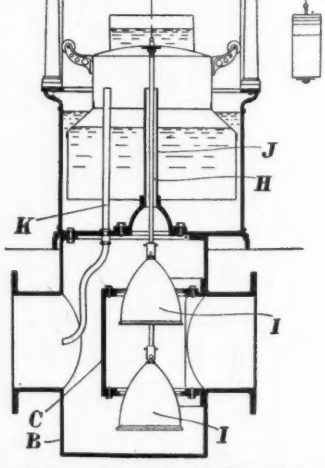
No. 20,130; Sept. 4, 1912.

Under this invention, the governor is so constructed and arranged that the level of the liquid seal "may be readily adjusted in such manner as to put the automatic regulation means entirely out of action, and so cause the apparatus to act as an ordinary governor."

The governor shown is made with a cylindrical casing secured to a valve chamber B with a valve box C secured therein. Fitted in the casing is a counterbalanced bell connected with a balance-beam mounted on a frame or bridge carried on the casing—the bell being preferably provided with guide wheels, adapted to run on rails on the frame. Connected, by the rod H, with the bell are valves I, adapted to engage valve seats in the valve box. Secured on the bottom of the casing is a tubular member J, which surrounds the rod, and so ensures a water-tight joint. The valve chamber C communicates with the gas inlet and outlet pipes, and leading from the outlet pipe to the interior of the bell



Stephenson and Firth Blakeley and Co.'s Water-Gas Generator.



Milne and Cowan's Gas Governor.

is a pipe K. The bell is made with an upper reduced portion and with an intermediate tapered (or coned) portion. The liquid seal is provided between the casing and the bell; and the arrangement is such that, on the pressure in the outlet pipe falling below a certain predetermined point, the water level of the seal reaches the intermediate portion, and so causes an increase of pressure in the outlet pipe. A water-loading tank L is provided on the bell.

Crucible and Melting-Pot Furnaces.

TOOTH, L. F., of the Commercial Gas Company, Stepney, E.

No. 8474; April 10, 1913.

This is a modification of the apparatus described in patent No. 30,287 of 1910, and comprises an improved construction of gas furnace, "whereby the furnaces can be easily erected and . . . be readily cleaned when desired."

Two forms of the furnace are shown in vertical section and sectional plan.

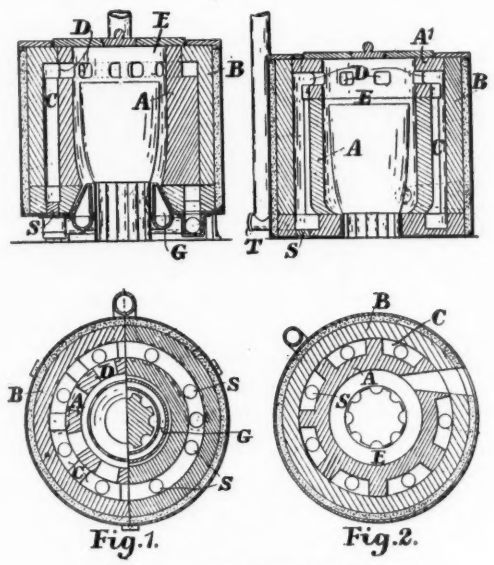


Fig. 1. Fig. 2.

Tooth's Crucible or Melting-Pot Furnaces.

To simplify the construction of the furnace, it is formed of a pair of concentric cylinders A B, spaced apart by vertical ribs formed on the outer part of the cylinder A, or on the inner part of the cylinder B, so as to form, between the cylinders, vertical flues C. As shown in fig. 1, the outlets D may be formed in the upper part of the cylinder A, or they may be formed in a separate ring A^1, as in fig. 2.

In the furnace shown in fig. 1, the chamber E is fired by an annular burner G; but in fig. 2 the furnace is fired by a burner projecting through an opening arranged tangentially with respect to the combustion chamber E, as in the 1910 patent. The floor is inclined upwardly from each opening, and each burner is arranged at an angle corresponding to the inclines, "so that the flame from each burner travels spirally upwards and passes above the opening of the next succeeding burner." Thus the chamber is heated by a number of spiral non-interfering flames.

In the forms shown the furnaces are built-up of cylinders, spaced apart by straight vertical ribs to produce straight vertical flues. It is not absolutely essential, however, for the ribs to be vertical, as the cylinders can be spaced apart by ribs otherwise disposed—inclined to produce spiral flues, or they may be horizontal, in which case they are formed in short sections, and are disposed in staggered formation so as to produce tortuous or zig-zag flues. A number of removable plugs S are fitted—one at the bottom of each vertical flue—so that a brush can be inserted to clean the flues. To get at the flues, a door T is arranged at the base of the chimney or in the side of the furnace, by removing which a flue brush can be passed round the flues.

APPLICATIONS FOR LETTERS PATENT.

20,756.—ALSTON, C. H. T., "Nozzles for the expansion of gaseous fluids." Sept. 15.

20,767.—ROBINSON, H. W., "Treatment of coal tar." Sept. 15.

20,820.—TOON, C., "Caulking lead joints." Sept. 15.

20,938.—HOLZWARTH, H., and JUNGHAUS, E., "Gas-turbines." Sept. 16.

20,964.—LEECH, W. J. B., and EDWARDS, A., "Treatment of hot gases." Sept. 17.

20,987.—LUCKE, C. E., "Combustion of combustible mixtures." Sept. 17.

21,038.—WHITE, W., "Gas-heaters." Sept. 17.

21,039.—BROWN, E. S., and GORDON, E. J., "Generating gas for lighting." Sept. 17.

21,116.—SWEET, E. L., "Gas water-heaters." Sept. 18.

21,213.—ATHION G.M.B.H., "Obtaining heating gases." Sept. 19.

21,253.—DARWIN, R. D., "Inverted burners." Sept. 20.

21,290.—FISCHER, J., "Process for the immediate fractional recovery of bye-products." Sept. 20.

MISCELLANEOUS NEWS.

BRITISH COMMERCIAL GAS ASSOCIATION.

Report of the Executive Committee.

At a Meeting of the Executive Committee of the British Commercial Gas Association held last Tuesday, a report was submitted for consideration by the General Committee, in the course of which much satisfaction was expressed at further substantial additions having been made to the steadily growing list of subscribers. Since the last meeting of the General Committee, 23 undertakings have notified their willingness to co-operate. They are: Anstruther, Arundel, Ascot, Bridport, Brighton, Cork, Cowes, Eastbourne, Grindley, Halesowen, Hollingworth, Knowle, Londonderry, Marple, Rugeley, Seaton, Shrewsbury, Southgate, South Metropolitan, South Suburban, Stalybridge, Tiverton, and Tyldesley.

POSITION OF URBAN DISTRICT COUNCILS.

It having been found necessary (as previously reported) to approach the Local Government Board regarding the right of urban district councils to subscribe to the funds of the Association, Mr. Goodenough, after considerable correspondence, arranged for an interview with Mr. John Burns, when he laid all the facts of the case before him. Mr. Burns stated that he was in full sympathy with the objects of the Association, that he considered money spent in support of its work would be money wisely spent by gas undertakings, and that if the money so spent were described as payment for "goods supplied and services rendered"—the goods supplied being the "Bulletin," the advertisements inserted by the Association in papers having a national circulation, and the samples of literature sent by the Association to its subscribers—such payments would not be made the subject of a surcharge by the Local Government Board. This satisfactory decision has been communicated to the various urban district councils, and several have since agreed to subscribe. Seeing that the legal disability has now been removed, it is anticipated that many more local authorities will join our ranks.

CO-OPERATION WITH DISTRICT ASSOCIATIONS.

The policy of co-operation with the various District Associations is being fully maintained. The Association is considerably indebted to these Associations for the hearty manner in which they seek to bring our claims for support to the notice of non-subscribers; and the continued increase to our list of subscribers is, doubtless, to a certain extent, the result of this influence. The Executive take the opportunity of expressing their indebtedness to the various District Association officials for their generous and hearty support, and for the excellent work which they have undertaken on behalf of the Association.

LOCAL PUBLICITY.

It having been suggested that the Association might compile some statistics regarding the amount spent on publicity work by various subscribers, detailed forms were issued with a request for information. Many of these have been returned; and the information, which is of an exceedingly interesting nature, will be published at an early date. As the information received is of a confidential nature, no indication as to its source will, of course, be given. One of the most hopeful signs in this connection is the comparatively large amounts which some (in many instances, small) undertakings are spending in educating their customers, and seeking to extend their business by systematic publicity methods.

LIGHTING OF CHURCHES, &C.

Information is also being compiled regarding the lighting of public buildings; and it is anticipated that, when the forms are completed, some useful figures will be available as to the comparative use of gas and electricity for these places. As far as can be seen at present, while in many places gas is more than holding its own, this section of business does not put up the strong fight justified by its relatively strong position as regards cost, efficiency, and ventilating effect.

THE COAL MERCHANTS' CIRCULAR.

One of the finest testimonials to the success of the Association propaganda is to be found in the now notorious circular issued by the Society of Coal Merchants. Many of the statements contained in it were almost too absurd for serious consideration; but the fact that the suppliers of coal are so alarmed at the change in public opinion and practice regarding gas-fires, is a cheering and stimulating comment on the success of gaseous heating. The Executive issued some very effective advertisements, controverting the misstatements referred to; and a special leaflet has also been published, which has been distributed in the areas in which the coal merchants' circular was issued. There is every indication that, instead of their circular aiding the merchants' business, their last state, in this connection, will be worse than their first.

WORK WITH SANITARY AUTHORITIES.

Special work has been carried out by the Association in seeking to inform and educate public opinion as to the truth about gas from the hygienic point of view. One of the most important sections dealt with in this propaganda work has been that dealing with sanitary authorities. Special letters, with copies of some of the most effective specimens of our literature, have been posted to every member of the Royal Sanitary Institute, and many interesting acknowledgments have been received. From the correspondence, it is evident that a good impression has been made, and future results, in the form of a more intelligent appreciation of the services gas is able to render, with a correspondingly smaller amount of ignorant criticism, may be confidently expected. This is only one of the many indirect services rendered by the Association,

and which only an organization such as ours could be expected to successfully carry out.

OFFICE RECORD.

A fair idea of the amount of routine work now carried on by the office staff will be gained by consideration of the following figures. Since the last meeting of the General Committee, 496 inquiries in response to advertisements have been received, answered, and forwarded to the gas undertaking in whose area the inquirer resides. Many of these inquiries have necessitated special correspondence, as the policy in this, as in other matters, has been to give the greatest possible satisfaction, and secure, if possible, a new gas consumer. This work has yielded encouraging results, as many testimonials have been received as to the sound business resulting from the judicious following up of inquiries forwarded by us. The number of inquiries received to date now totals 7713, which have been forwarded to 903 undertakings. Another section of office work which has developed in an extraordinary manner is the literature or sales account.

ANNUAL MEETING.

Arrangements are well in hand regarding the second annual conference to be held on the 21st and 22nd of October. The books will be closed on the 30th of this month and a balance-sheet prepared. The Auditors have examined the books as far as possible, and will complete their work without delay, so that the statement of accounts may be fully certified before being presented to the general meeting.

THE POSITION OF CO-PARTNERSHIP GAS COMPANIES.

Letter from the Chairman of the South Metropolitan Gas Company.

In last Tuesday's London papers, the following interesting letter appeared from the pen of Mr. Charles Carpenter, D.Sc.

The continued unrest in the labour world prompts me to ask the hospitality of your columns to refer once more to the remedy of industrial co-partnership. Its success in the case of the South Metropolitan Gas Company is as undoubted as its existence; and in a paper read before the recent meeting of the British Association, I think I clearly showed that there is no incompatibility between its doctrines and those of trade unions.

But it has been objected that a gas company is not analogous to other industrial undertakings, since its business is in the nature of a monopoly. Time did not permit me to deal with this question at the meeting; but there is no doubt that the majority of my hearers were of the opinion that a gas company's business is of quite an unusual character, and does not afford any guide as to what can be done for industry as a whole in the abolition of unrest. May I briefly attempt to clear away such an objection, for it is one which bars the most direct and simple road to peace?

The only monopoly a gas company receives from Parliament is the right, under certain conditions, to lay down pipes for the conveyance of gas within a stated area. This right was given, subject to restrictions in the matter of dividends, in substitution for the formerly existing system by which the power to lay these pipes was an unrestricted one. The public has been an enormous gainer by the change. Quite lawfully, large areas of land have been acquired by various undertakings for the purpose of mining coal, iron, salt, &c. The owners' rights in these are far more absolute than those of a gas company to its district of supply, where Parliament has intervened and laid down the condition that it can only distribute among the shareholders one-fifth of any extra profit earned beyond 4 or 5 per cent.

In no other than the above sense has a gas company a monopoly. It sells gas for power in competition with gas made locally by suction or other plants, and with electric or hydraulic energy; for lighting, in competition with electricity or mineral oil; and for heating, in competition with coal. But it could not exist without profit from its residuals—coke, ammonia, acid, tar, &c.; and these it sells in competition with the whole kingdom.

The success the gas companies have achieved in co-partnership is principally due to the lead given by the greatest master gasmaker of modern times, the late Sir George Livesey. The gasmakers followed him; and none have had cause to regret it. Is there no such captain of industry among the mine-owners, or the railways, or the other great industries, who will rise up and do for other industries what Livesey did for gas?

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

An Unsatisfactory Report by the Directors.

The Half-Yearly General Meeting of the Alliance and Dublin Consumers' Gas Company is being held to-day (Tuesday) at the offices, D'Olier Street, when the Directors present the report and statement of accounts for the half year to June 30 last.

In the report, they say that the total revenue amounts to £157,640, and the expenditure (including interest on loan capital, &c.) to £129,971—showing a profit of £27,669. Out of this amount, £2000 has been written off the suspense account, leaving a balance of £25,669, to which is to be added £1226 brought in from the last account, making a total of £26,896.

The report continues: Owing to the very great increase in the cost of coal, oil, and other materials, and of labour, the Directors cannot, on the present occasion, recommend the payment of a dividend on the consolidated ordinary stock at a higher rate than 4 per cent. per annum. This dividend will amount to £29,227; and, in order to pay same, it will be necessary to draw on the reserve fund to the extent of £2331. The Directors have decided to increase the price of gas by 2d. per 1000 cubic feet—to take effect from the beginning of the December quarter.

The total revenue, referred to above, of £157,640, compares with £163,552 six months ago, and with £156,675 for the corresponding period of last year. The three figures for expenditure were, respectively, £129,971, £127,464, £116,993. Similarly the balances of profit applicable to dividend were: £26,896, £37,760, £40,206. A year ago a dividend of 5 per cent. was paid on the consolidated stock of the Company, with £3672 carried forward; six months since the same dividend was paid, with a carry-over of £1226; while now 4 per cent. only is to be paid by drawing on the reserve fund for a sum of £2331.

The statement of gas made, sold, &c., shows that the quantity made was 786,207,000 cubic feet (including 212,091,000 cubic feet of carburetted water gas), and the quantity sold, 695,673,000 cubic feet; the total accounted for being 706,266,000 cubic feet. The estimated quantities of residuals produced in the half year were: Coke, 29,208 tons; breeze, 5591 tons; tar, 524,076 gallons; ammoniacal liquor, 1,216,166 gallons. The estimated quantities used in manufacture were: Coke, 6543 tons; breeze, 905 tons; and ammoniacal liquor, 1,437,274 gallons.

An Engineer appointed to examine the Company's Affairs.

The following circular has been issued by a dissatisfied shareholder in the Company.

Alliance and Dublin Consumers' Gas Company.

Dear Sir (or Madam),—As, directly and indirectly, I am largely interested in the above Company, I have seen with great concern the steady and persistent fall that has taken place in the value of the shares.

I have been in correspondence with the Board, at intervals, for some time past on this subject; and the Chairman has always assured me that the shares of the Dublin Company had simply suffered along with all other securities (especially Irish ones) which, as you are aware, have, generally speaking, declined during the last two or three years. In spite of this assurance, I still felt there must be some other reason that had contributed to the severe depreciation; and I therefore wrote to the Chairman, asking if I could meet the Board, to discuss with them the position of the Company.

To my request the Chairman consented; and he also sent me a copy of a report, dated July, 1913, made to the Board by their Consulting Engineer, Mr. Harry E. Jones, of London. The said report made me exceedingly uneasy, as, rightly or wrongly, it conveyed the impression that it was merely prepared in anticipation, to justify the Board and management, and held out no hope of any change in the future. Seeing how unsatisfactory is the report to be presented at next Tuesday's meeting, this impression is rather strengthened than otherwise.

I met the Board by arrangement on Tuesday morning last, and also their Consulting Engineer, Mr. Jones; and I placed before them comparisons of the Dublin Company with other gas companies. I give below some of the figures I laid before the Board:—

	Dublin.		Average of all Gas Companies from Returns and Analysis.
Wages	1·31	..	2·05
Salaries and distribution	1·55	..	1·02
Residuals	8·94	..	10·03
Receipts for gas sold	38·04	..	21·92

	Coal and Oil.		Residuals.		Net Coal and Oil.
Dublin	17·29	..	8·94	..	8·35
Belfast	11·33	..	9·42	..	1·91
Advantage of Belfast over Dublin					6·44

	Dublin.		Belfast.
Cost of coal and working expenses, less residuals	33 04	..	22·28

[All the above figures are per 1000 cubic feet of gas sold, and are for the year 1912.]

The whole of the discrepancies the Board could not explain away, though they were perfectly open and candid, and freely placed at my disposal such information as was available. Also, it is only fair to say that Mr. Jones has promised to dissect my figures, and then write me fully.

I have come to the conclusion, on due consideration, that there is a grave leakage somewhere. This, I think, is plainly evident to the ordinary business man. I have, however, the consent of the Board to send over an independent expert if I wish, to make a thorough investigation; and the name I have suggested to them is that of Mr. W. Newbigging, of Manchester—a gas engineer of the highest standing and wide experience. It is impossible to have that report in time for the half-yearly meeting on Tuesday next, but as soon as I receive same I will send you a copy. If that report is of such a nature as calls for independent action on the part of the shareholders, as a body, I will make it my duty to call them together to consult on the situation. The meeting would, in that case, probably be held in Manchester, as it would be a convenient centre for the shareholders generally. I am sending a copy of this circular to the Chairman.

(Signed) F. J. DICKENS.

P.S.—I am dispatching this circular so that it may reach you before the meeting to be held on Tuesday next; and in case you wish to make your own inquiries, I shall be pleased if you will then take the opportunity of doing so. I also wish to add that the course I am taking in this matter has the approval and support of a large and influential body of Lancashire shareholders.

Birmingham Public Lighting.—At a special meeting of the Birmingham City Council to-morrow, the Lighting, Stables, and Refuse Disposal Committee will present a report in which figures are given in regard to the public lighting. The number of public lamps in the city on March 31 last was 17,880 and 4181 court lamps—a total of 22,061, compared with 21,937 the previous year. In addition, there are 124 electric lamps in Handsworth and 19 in Aston. The total expenditure on public lighting, including gas, wages, repairs, painting of lamps, &c., amounted to £46,883.

BRITISH GASLIGHT COMPANY, LIMITED.

The Half-Yearly Meeting of this Company was held last Wednesday, at the London Offices, No. 11, George Yard, Lombard Street, E.C.—Mr. JOHN HORSLEY PALMER (the Chairman) presiding.

The SECRETARY (Mr. A. W. Brookes) read the notice convening the meeting, and then the Directors' report, as well as the accounts of the Norwich station. The Directors' report was as follows:

The Directors submit the half-yearly accounts of the Company to the 30th of June last, as examined and certified by the Auditors, who have also vouched for the correctness of the investments held by the Company.

The available profit is £31,594 14s. 9d., after deducting the following sums:—

Income-tax	£2,377	19	4
Hull debenture interest	2,118	15	0
Norwich ,, ,,	1,779	15	0
Potteries ,, ,,	659	3	4
Trowbridge ,, ,,	164	15	10
Interest on debenture stock	2,260	0	0
	£9,360	8	6

HULL.—The gas rental shows an increase of £3073 as compared with that of the corresponding period of 1912; the price of gas having been the same—viz., 1s. 10d. per 1000 cubic feet. Coke shows an increase of £2073; tar and tar distilling, an increase of £1836; ammoniacal liquor and sulphate of ammonia, an increase of £824; coals have cost 13s. 5d. per ton, as against 13s. 2d.; coke has realized 13s. 11d. per ton, as against 13s. 7d. The gas sold shows an increase of 33,307,549 cubic feet—equal to 4·51 per cent. The quantity supplied in bulk to the Corporation for the supply of the Old Town was 45,374,000 cubic feet—being 866,000 cubic feet more than in the same period of 1912. The profit realized, after writing-off the sum of £5604 10s. 8d. on account of the cost of alteration and extension of works, is £18,620 6s., which is the amount of the authorized parliamentary interest. The balance to the credit of the reserve fund account is £39,748 15s. 3d.

NORWICH.—The gas rental shows a decrease of £395 as compared with that of the corresponding period of 1912; the price of gas having been the same—viz., 2s. 10d. per 1000 cubic feet, with reductions for gas used for manufacturing purposes. Coke shows an increase of £1629; and tar and ammoniacal liquor, an increase of £149; coals have cost 16s. 3d. per ton, as against 16s. 4d.; coke has realized 16s. 11d. per ton, as against 16s. 2d. The gas sold shows a decrease of 1,609,600 cubic feet, equal to 0·59 per cent. The profit realized is £44 9s. 5d. in excess of the parliamentary interest.

POTTERIES.—The gas rental shows an increase of £61, as compared with that of the corresponding period of 1912; the price of gas having been the same—viz., 2s. 6d. per 1000 cubic feet, with a rebate of 3d. per 1000 cubic feet for prompt payment. Special rebates to large consumers and to consumers of gas for power purposes are allowed, in addition to the aforesaid reduction. Coke shows an increase of £1366; tar, an increase of £772; and ammoniacal liquor and sulphate of ammonia, an increase of £483; coals have cost 12s. 3d. per ton, as against 11s. 6d.; coke has realized 10s. 5d. per ton, as against 8s. 4d. The gas sold shows an increase of 3,879,233 cubic feet, equal to 1·92 per cent. The profit realized, after writing-off the sum of £2000 on account of old gasholders now demolished, is £726 3s. 1d. less than the parliamentary interest.

TROWBRIDGE.—The gas rental shows a decrease of £47, as compared with that of the corresponding period of 1912; the price of gas having been the same—viz., 3s. per 1000 cubic feet, with discounts. Residual products show a decrease of £150. Coals have cost 17s. 9d. per ton, as against 16s. 5d.; coke has realized 13s. 6d. per ton, against 15s. 1d. per ton. The gas sold shows a decrease of 220,433 cubic feet, equal to 0·65 per cent. The profit realized is £421 15s. 4d. less than the parliamentary interest.

HOLYWELL.—The gas rental shows a net increase of £51; residual products an increase of £12. The profit realized is £392 15s. 2d.

The available profit, added to the previous balance of profit and loss, amounts to £106,369 15s. 8d. From this sum, the Directors recommend a dividend at the rate of 10 per cent. per annum, with a bonus of 5s. per share—both less income-tax. The dividend and bonus will amount to £31,192 14s. 2d., and leave a balance of £75,177 1s. 6d.

The Directors, acting under the regulations of the Company, have filled up the vacancy in the Board of Directors by appointing Mr. Lewis Robert Abbey-Williams a Director as from the 1st of May last.

The Directors who go out of office are Sir Corbet Woodall and Mr. Robert S. Gardiner; and the Auditors are Mr. E. Knowles Corrie and Mr. William Cash, F.C.A. They respectively offer themselves for re-election.

The CHAIRMAN said, before offering the few remarks he had to make on the general business that had taken place during the six months under review, he wished to thank the shareholders who were present at the previous meeting for the kindly way in which they had then referred to him. At that time he was in a very bad state of health; and he was glad now to be able to attend to personally thank the shareholders and take up his duties as Chairman of the Company. He had very little to say in moving the adoption of the report and accounts, because there was not anything of any very great interest to put before the members with regard to the working of the past six months. His valued and esteemed colleague, Sir Corbet Woodall, who took the chair on the previous occasion, had given such a very full account, not only of what they had done, but of what they were going to do during the next six months, that the only objection he had to make was that he had left very little for him (Mr. Horsley Palmer) to say on the present occasion. During the half year under review, there had been 35½ million cubic feet more gas sold than during the corresponding half of 1912. This was only an increase of 2·84 per cent.; but if they looked back a year further, it would be seen that there was a very large increase indeed—amounting to 6½ per cent., and, of course, they could not expect their business to go on increasing at this very high rate. He was perfectly satisfied with the increase that had taken place during the last six months, and was confident that there would be a steady increase at the different stations—especially at Hull, where the Company had, as Sir Corbet Woodall had already told them, been putting up a very extensive plant on the very latest system of vertical retorts, and where they were now enjoying the benefit of the new installation. The capital expended on the works he referred to at Hull amounted to £42,000. Of this, £20,871 was chargeable to revenue, as the new plant took the place of old works that had been carefully valued and worked out. The amount had been gradually written-off from time to time. Thus in the half year ended June, 1912, £3500 had been written-off; in the half year to December, 1912, £8500; and in the half year under review £5600—making a total written off of £17,600, and leaving a little over £3000 still to be charged. This, of course, was satisfactory, because not only had they not taken anything from the reserve fund on this occasion, but the surplus profits had been devoted to writing down this charge. No doubt many of the shareholders would have noticed from the report which the Secretary had read that there was a small falling-off in the amount of gas sold in Norwich. This was not a falling-off from their private business; it was owing to the Corporation having gone in very extensively for public lighting by electricity from their own works. The Company had therefore had to abandon a considerable amount of the public lighting. On the other hand, the private business had been pushed to a very great extent. Extensions into the surrounding districts of Norwich were in contemplation; and he had no fear but that in six months' time they would be able to report an increase in the sale of gas at Norwich. With regard to the other stations, there was really nothing to say. The business was proceeding very satisfactorily in every department. Speaking generally, he considered that the business of the Company was in a thoroughly sound and satisfactory condition. The large increase that had taken place during the last two years had only necessitated an increase in capital expenditure of 3 per cent., notwithstanding the fact that during this period gas sales had increased by 111½ million cubic feet, or 9½ per cent. Seven months ago they had the misfortune to lose by death one of their Directors; and, after a careful consideration of the merits of several gentlemen who wished to come on the Board, they decided to elect Mr. Lewis R Abbey-Williams, whose relations and immediate connections had been interested in the Company from the very commencement. He (the Chairman) had no doubt that the new Director would prove a very active and efficient member of the Board. Before concluding, he wished to refer to one thing that the members had already read about in the Press—namely, the National Gas Exhibition. This would be certainly the largest and the best planned exhibition that had ever been held in England; and he hoped that all the shareholders of the British Gaslight Company who were within reach of Shepherd's Bush would go there next month and interest themselves in it. In their Company they had an enormous number of lady shareholders, and he hoped that they especially would take an interest in the Exhibition to be opened on Oct. 1 by the Lord Mayor. One of their Directors, Sir Corbet Woodall, was taking a very prominent part in it. If he (the Chairman) might express a very personal and private opinion, he would recommend them to allow a week to elapse before attending, as by that time the exhibition would be sure to be in a complete state. One or two things had during the last six months given the Directors anxiety. In the first place the National Insurance Act imposed upon them a contribution of £800 a year. They had also to contend with dearer coal, added to which there was the increased cost of living, which told very hardly upon their workmen—especially in a town like Hull. These different matters would no doubt have to be met by increased expenditure, which he hoped would not be of such a nature as to cause a rise in the price of gas. In the future there would undoubtedly be times of great anxiety to directors and everybody interested in the gas industry, although he did not wish to alarm the shareholders. With these observations he moved that the report and accounts be received, adopted, and entered on the minutes of the Company.

Mr. FREDERICK WILKIN seconded the motion, which was unanimously carried.

On the proposition of the CHAIRMAN, seconded by Major-General WILLIAM T. CORRIE, a dividend was declared at the rate of 20s. per share, and a bonus of 5s. for the half year—both less income-tax.

The CHAIRMAN then proposed the re-election, as a Director of the Company, of Sir Corbet Woodall. He wished, on behalf of the shareholders of the British Gaslight Company and himself, to tender to Sir Corbet Woodall their congratulations upon the honour which had been conferred upon him by His Majesty. Sir Corbet Woodall was so well known to the shareholders that he need not go into a long history of his career, or refer at length to the efficient services he rendered to the Company. It was a great pleasure to his fellow Directors to have him on the Board, and a great benefit to the Company.

Mr. FREDERICK WILKIN seconded the motion, which was unanimously agreed to.

Sir CORBET WOODALL thanked the Chairman for the kind way in which he had submitted the motion to the meeting, and the shareholders for having re-elected him to a position which he highly valued. The only thing in the Chairman's speech to which he would refer was with regard to the members attending the National Gas Exhibition. He hoped they would not be discouraged against coming during the first few days; but that, on the contrary, they would come early, and come often.

The CHAIRMAN, in proposing the re-election of Mr. Robert S. Gardiner to a seat on the Board, said that gentleman rendered great services to the Company as he was very much *au fait* with the principal thing they used—namely, coal.

Major-General CORRIE seconded the motion, which was carried unanimously.

On the motion of Mr. KENNETH R. MACKAY, seconded by Mr. WILLIAM RICHARDS, Mr. E. Knowles Corrie was re-elected as Auditor of the Company.

On the motion of Mr. FREDERICK A. JANSON, seconded by Mr. RICHARDS, Mr. William Cash was also re-elected as Auditor.

Mr. ARTHUR G. BURNEY moved a cordial vote of thanks to the Chairman and Directors. He hoped he might be allowed to express the satisfaction of the shareholders at seeing the Chairman back in his place again, which he took to be a sign of improved health. They were all gratified with the report that had been presented to them, and he took it that, as nothing had been said to the contrary, the relations between themselves and the men were on the usual satisfactory basis.

Mr. RICHARDS seconded the motion, which was carried unanimously.

The CHAIRMAN, on behalf of himself and the Board, thanked the members for the kind expression of their opinions. He could only say that they would do their duty he hoped in the future as they had

done it in the past. The next motion was one which Sir Corbet Woodall had generally taken in hand, but as he had such a bad cold that day he would move for him – that the thanks of the meeting be given to the Secretary and officers of the Company. At every meeting he thought it had been clearly expressed how very valuable were the services of all the officers, and there was a feeling of *esprit de corps* throughout all their offices. Whenever he visited one of the stations, he always felt that, from the Manager of the station down to the lowest clerk, they were all doing the best they could for the Company. Of course, the men were treated as good masters should treat them; and this no doubt contributed largely to the success of the Company.

Mr. Frederick Wilkin seconded the motion, which was carried unanimously.

Mr. A. W. Brookes (the Secretary) briefly returned thanks; and the proceedings terminated.

SALFORD GAS AND ELECTRICITY DEPARTMENTS.

Good Profits on Gas—Loss on Electricity.

Mr. John Elliott, the Borough Treasurer of Salford, has just issued his abstract of the accounts of the Corporation for the year 1912-13. The result of the year's working of the several revenue accounts showed a net surplus of £27,876; the actual surplus being £73,354, and the deficiency £45,478.

The net gas profits of £43,827, compared with last year, showed an increase of £25,827. The increase in the cost of manufacture and distribution amounted to £7637; but against this there was an increase in the income from the sale of gas and residuals amounting to £13,354; a reduced contribution to the depreciation funds of £18,267; a decrease of £116 in the interest and sinking fund charges; and a gain of £1728 through consumers not claiming their deposits on meters.

The Electricity Department was not able to show a profit after £4618 had been transferred to the depreciation and renewals fund. This was £7000 worse than the previous year's trading. There was an increase in the cost of generation, distribution, &c., including replacements of machinery after the disastrous fire, of £17,160. In respect to the fire, it may be mentioned that the sum of £11,330 was received from the insurance companies.

STOKE-ON-TRENT CORPORATION GAS SUPPLY.

The Elimination of "Profit" under the Federation Act.

Last Tuesday's "Staffordshire Sentinel" published a summary of the accounts of the Gas Department of the Stoke-on-Trent Corporation. The figures were derived from an examination of the printed annual accounts, as presented to the Council; and in the figures they quote the odd money is omitted.

It will be remembered, says our contemporary, that, by the terms of the Federation Act, the gas and electricity undertakings were not to make profits for the rates, as formerly, but gas and electricity were to be sold at "cost price." This was intended to prevent a town owning a gas or electricity undertaking from making profits for the whole county borough area, and to secure to each town the "profits" of its own productive undertakings—this being done not by balances of profits passing to the rates, but by selling the gas or electricity at a cheaper price owing to the elimination of the direct contributions to the rates. This was technically an advantage to the consumers and a disadvantage to the ratepayers, even in the separate areas. But it was contended that consumers and ratepayers being practically the same, the point was not of importance. There is, however, and always has been, considerable difference of opinion upon the matter; and upon the question of whether the ratepayers or the consumers should be first considered. And in some quarters there is a feeling that the Federation Act arrangements should be amended so as to provide for the gas and electricity undertakings contributing directly to the rates, as formerly.

Capital Account of the Four Gas Undertakings.

The amount of loans sanctioned in connection with the four works is £416,450, of which £407,450 was raised by stock or loans.

During 1912-13, £10,799 was paid in interest; £7637 of debt was redeemed during the year; the sinking fund received £4506 during the year; and the total stock cancelled and loans redeemed during the year came to £146,266. On March 31 last, there was £13 892 in the sinking fund; and the amount of stock and loans outstanding on March 31 last was £261,183. In other words, allowing for the amount in the sinking fund, the debt on the four gas-works on March 31 last was £247,291, or nearly a quarter of a million.

The stock cancelled and loans redeemed in 1912-13 were as follows: Burslem, £38,277; Stoke, £31,712; Fenton, £26,974; Longton, £49,302. The balance in the sinking fund at March 31 last was made up as follows: Burslem, £10,810; Stoke, £530; Fenton, nil; Longton, £2551. The amount of stock and loans (total debt) outstanding at March 31 last was made up as follows:

Burslem	£80,722
Stoke	53,287
Fenton	44,025
Longton	83,147
	£261,183
Deduct amount in sinking fund	13,892
Net debt	£247,291

But in addition to the loans and stock outstanding, and in addition to loans extinguished out of revenue, a considerable amount of revenue has been transferred to capital, in lieu of raising loans. The amounts of loan extinguished out of revenue are as follows: Burslem, £38,277; Stoke, £31,712; Fenton, £26,974; Longton, £49,302. Total, £146,265.

The revenue transferred to capital in lieu of raising loans is as follows: Burslem, £12,155; Stoke, £21,453; Fenton, £11,354; Longton, £27,858. The total amount of capital expenditure paid for out of revenue (in addition to the ordinary loan repayments out of revenue) is therefore £72,820.

Total Capital Outlay.

The total capital outlay on the four works (omitting money now in sinking fund, &c.) has therefore been as follows:—

Burslem	£131,155
Stoke	106,453
Fenton	82,354
Longton	160,508
	£480,470

Adding the amounts now in the sinking funds, reserves, &c., it may be said in round figures that half a million has been expended on the four municipal gas undertakings, and that a quarter of a million of debt on capital account remains to be paid off in due course out of revenue.

Fenton had a reserve fund in the bank of £1327, and Longton £1450; but Burslem and Stoke had no special reserve fund.

Rate of Interest.

The original loan for the Burslem Gas-Works (£180,000) was borrowed at 4½ per cent.; in 1897, a loan of £5000 was obtained at 3 per cent.; and subsequent loans have been from 3½ to 3⅞ per cent. The original Stoke loan was 4 per cent.; others being 3⅝, 3¾, 3¼, 3½, 3 per cent.; and more recently 3½ per cent. The Fenton loans were at 4, 4½, 3⅝, 3¾, 3⅛, and (in 1898) 3 per cent. The Longton loans were at 4¼, and 3⅜ per cent.; and since 1885 at an average of 3½ per cent.

Revenue Account.

Turning now to the revenue account, showing the expenditure and income of each of the works for the year ended March 31 last, the following figures are shown:—

	Income.	Expenditure.	Gross Profit.
Burslem	£29,643	£22,102	£7,540
Stoke	20,651	15,846	4,805
Fenton	14,351	10,970	3,381
Longton	25,005	17,442	7,562
	£89,650	£66,360	£23,288

Particulars of Expenditure.

The cost of manufacture includes fuel, salaries, wages, repairs, renewals, maintenance, &c.; "distribution" also includes salaries, repairs, renewals, &c.; "management" means a contribution to the finance department, general establishment charges, &c. With the foregoing explanation, the following groupings of the expenditure on renewal account may be given:

	Burslem.	Stoke.	Fenton.	Longton.
Manufacture	£15,907	£11,612	£8,421	£12,284
Distribution	2,640	1,504	1,011	1,988
Public lamps	829	546	349	851
Rent, rates, taxes, insurance	2,043	1,598	907	1,757
Management	648	507	280	548
Written off	32	77	—	12
Total expenditure	22,102	15,846	10,970	17,442
Gross profit	7,540	4,805	3,381	7,562
Total income	29,643	20,651	14,351	25,005

Rates Paid by Gas-Works.

The amounts paid by the four works in rates were as follows:—

Burslem	£1634
Stoke	1428
Fenton	755
Longton	1379
Total	£5196

This is equivalent to a rate contribution of over 1½d., as a penny rate brings in about £3000.

Public Lighting.

The income and expenditure for public lighting were as follows:—

	Income.	Expenditure.
Burslem	£1898	£829
Stoke	2310	546
Fenton	1207	349
Longton	1811	851
Totals	£7226	£2575
Deduct	2575	
Net income	£4651	

The four gas undertakings therefore apparently made a "profit" out of the ratepayers for public lighting amounting to about a 1½d. rate; and if the rates paid by the gas undertakings be set against this, it may be said in one way that the public lighting costs the Corporation nothing, but is paid for by the gas undertakings. If, however, this view were accepted, the gas undertakings would cease to be "ratepayers," and the 1½d. they pay in rates would have to be paid by the ordinary ratepayers. The point would be noteworthy in connection with any discussion as to whether, and how much, the gas undertakings should contribute to the rates under any amendment of the Federation Act. As to this, our contemporary at present offers no opinion, beyond mentioning that it is, of course, the ratepayers' money that guarantees the debts of the gas undertakings in the last resort. But the "expenditure" on public lighting by the Gas Committee

seems to refer only to the cost of lighting, &c., and no account appears to be given of the cost of the gas supplied to the lamps.

Cost of Coal.

The expenditure on coal at the four works was as follows:—

Burslem	£11,553
Stoke	8,046
Fenton	6,075
Longton	8,705
Total	£34,379

The coal miners' strike in the early part of last year caused an extra expenditure for coal.

Annual Income.

The following are the particulars of the annual income of the four undertakings:—

Burslem.

	£ s. d.
Sale of gas:—	
Private lighting—	
Ordinary consumers	13,484 18 8
Prepayment consumers	10,679 13 8
	24,164 12 4
Less discounts	6,895 16 0
	17,268 16 4
Public lighting (all charges)	1,898 4 5
	£19,167 0 9
Stove rents	£589 18 1
Rent of free fittings	—
	£589 18 1
Sale of residuals, less labour, &c.—	
Coke and breeze	5,679 11 1
Sulphate of ammonia	1,531 5 8
Tar	2,409 5 0
Liquor	—
	£9,620 1 9
Fittings profit	£266 13 0
	£29,643 13 7

Stoke.

	£ s. d.
Sale of gas:—	
Private lighting—	
Ordinary consumers	9,681 3 6
Prepayment consumers	8,222 4 1
	17,903 7 7
Less discounts	5,186 17 5
	12,716 10 2
Public lighting (all charges)	2,310 10 4
	£15,027 0 6
Stove rents	437 2 1
Rent of free fittings	—
	£437 2 1
Sale of residuals, less labour, &c.—	
Coke and breeze	3,295 18 5
Sulphate of ammonia	—
Tar	1,137 11 7
Liquor	696 5 7
	£5,129 15 7
Fittings profit	£57 5 11
	£20,651 4 1

Fenton.

	£ s. d.
Sale of gas:—	
Private lighting—	
Ordinary consumers	8,267 12 0
Prepayment consumers	7,209 3 8
	15,476 15 8
Less discounts	7,052 10 6
	8,424 5 2
Public lighting (all charges)	1,207 5 7
	£9,631 10 9
Stove rents	275 5 7
Rent of free fittings	—
	£275 5 7
Sale of residuals, less labour, &c.:—	
Coke and breeze	2,793 2 2
Sulphate of ammonia	—
Tar	941 1 7
Liquor	700 4 6
	£4,434 8 3
Fittings profit	£10 8 6
	£14,351 13 1

Longton.

	£ s. d.
Sale of gas:—	
Private lighting—	
Ordinary consumers	8,579 18 9
Prepayment consumers	9,936 16 9
	18,516 15 6
Less discounts	4,252 17 7
	14,263 17 11
Public lighting (all charges)	1,811 7 2
	£16,075 5 1
Stove rents	441 16 2
Rent of free fittings	470 0 0
	£911 16 2
Sale of residuals, less labour, &c.:—	
Coke and breeze	4,996 3 6
Sulphate of ammonia	1,059 18 7
Tar	1,664 0 0
Liquor	—
	£7,720 2 1
Fittings profit	£297 19 1
	£25,005 2 5

Profit and Loss Account.

The income or profit and loss account of the year is, of course, principally made up of the gross profit referred to above, to which are added some small rents of property, and, in the case of Burslem, Fenton, and Longton, bank interest; the totals of the income or profit and loss account being as follows:—

Burslem	£7684
Stoke	4885
Fenton	3538
Longton	7779

Out of this money, the loan repayment instalments, interest on loans, sinking fund instalments, income-tax, &c., are paid; and the Stoke undertaking had to pay £374 for bank interest. This left the following sums to be carried to net revenue account:—

Burslem	£1970
Stoke	728
Fenton	579
Longton	1320

Net Revenue Account.

The net revenue account shows that Burslem had £4351 in hand from the previous year; Fenton, £3544; and Longton, £1598. Adding the amounts now brought from the profit and loss account, the three towns had the following amounts in hand (net revenue account):—

Burslem	£6321
Fenton	4123
Longton	2916

Various capital payments out of this revenue were made for new mains, services, and meters; and the final result was the carrying forward of the following amounts in hand to next year:—

Burslem	£5819
Fenton	3856
Longton	2515

Stoke Net Revenue Account.

The net revenue account of the Stoke undertaking is in a different position. There was a debit balance of £7237 from the previous year; and to this is added about £600 for new works, giving a total of £7843. Deducting the sum of £728 brought from the 1912-13 profit and loss account, a debit of £7114 on current account was carried forward by the Stoke works. But the general balance-sheet shows that on March 31 last the Stoke works owed £9907 to the bank, which accounts for the £374 paid by Stoke for bank interest.

To sum up, the general balance-sheet showed the net revenue account to stand as follows:—

Balance in debit: Stoke, £7114.

Balance at credit: Burslem, £5819; Fenton, £3856; Longton, £2515.

General Results.

Among the miscellaneous information appended to the accounts, it is stated that the gas made during the year was as follows: Burslem, 237,201,000 cubic feet; Stoke, 156,307,000 cubic feet; Fenton, 113,658,000 cubic feet; Longton (including 4,323,000 cubic feet of water gas), 185,116,000 cubic feet. The sale of gas increased in Fenton and Longton, but decreased in Burslem and Stoke. The increase in Fenton was 2·64 per cent., and in Longton 3·68 per cent.; while the decrease in Burslem was 2·50 per cent., and in Stoke 1·59 per cent. Allowing for the gas sold and used on works, the gas unaccounted for was as follows: Burslem, 18,937,600 cubic feet, or 7·98 per cent. on the make; Stoke, 12,257,000 cubic feet, or 7·84 per cent. on the make; Fenton, 7,887,300 cubic feet, or 6·94 per cent. on the make; Longton, 10,521,200 cubic feet, or 5·68 per cent. on the make.

The coal carbonized was as follows: Burslem, 18,999 tons; Stoke, 11,980 tons; Fenton, 9268 tons; Longton, 13,890 tons. The gas made per ton of coal was: Burslem, 12,485 cubic feet; Stoke, 13,047 cubic feet; Fenton, 12,263 cubic feet; Longton, 13,016 cubic feet. In all, 119 tons of coke were used for water-gas manufacture.

The public lamps are as follows: Burslem, 738; Stoke, 850; Fenton, 437; Longton, 605. The stoves on hire are as follows: Burslem,

3365; Stoke, 2339; Fenton, 1174; Longton, 2312. The meters in use are as follows:

	Ordinary.		Automatic.
Burslem	2153	..	5901
Stoke	1941	..	4623
Fenton	580	..	4073
Longton	1550	..	6148

It will thus be seen that automatic meters are in a large majority.

WINDSOR GAS COMPANY.

The Half-Yearly General Meeting of this Company was held at the offices last Friday—Mr. W. B. HOLDERNESS (the Chairman) presiding.

The SECRETARY (Mr. W. E. Free) having read the notice convening the meeting, the report of the Directors was presented. In the course of it they stated that the balance-sheet showed continued progress in the prosperity of the Company, and enabled the Directors to propose that the statutory dividends should be paid on all the shares. After due consideration, they had resolved to make another reduction of 2d. per 1000 cubic feet in the price of gas, to come into operation from the 1st of January next, when the price would be 3s.

The CHAIRMAN, in moving the adoption of the report, said the works were in a high state of efficiency; but, owing to the increased make of gas, it had been found necessary to add to the purifying plant. This had entailed encroachment on the house occupied for many years by the Manager (Mr. H. Buckley), for whom, however, a new residence had been built. Taking into consideration the fact that they were fortunate in having a running contract for coal, the Directors came to the conclusion that they might fairly reduce the price of gas. It had been their wish for some time past to bring the price down to 3s. per 1000 cubic feet, and this had been accomplished. It was the lowest price at which it had ever been; and he believed the work of the Company had met with approbation by everyone who was interested in gas. With respect to the balance-sheet, he thought the shareholders would all agree with him when he said that it worked out well. During the past six months, they had obtained about a hundred new customers, which was gratifying evidence of the progress and prosperity of the Company; there had been an increase in the quantity of gas made of 3 million cubic feet; 88 cookers and 30 gas-fires had been fixed; no fewer than 2826 fitting orders had been attended to; and the receipts for the residuals showed better results than they had done before.

Mr. F. B. BUCKLAND seconded the motion; and, after a few remarks, it was carried.

The full statutory dividends were then declared; and the proceedings closed with votes of thanks to the Directors, staff, and workmen.

BIRMINGHAM CORPORATION GAS-METER CONTRACTS.

The Recent Charges of Favouritism.

[From the "Birmingham Daily Post," Sept. 23.]

At a Meeting of the Birmingham City Council on July 29, a question arose on the report of the Gas Committee with respect to meter contracts. [The matter was referred to in the "JOURNAL" for Aug. 5, p. 390.] On that occasion, Councillor Stevens (a member of the Committee) made charges of deliberate preferential treatment and favouritism to certain firms against the Committee in contracting for new gas-meters. He said:

> The department had resorted, to his mind, to dodgery and jobbery, and had caused the loss of considerable sums to the ratepayers of the city. Early in March Mr. Hilton, the Secretary of the Gas Committee, consulted him with reference to a French patent meter; and it was his opinion that the meter would have broken down in a very short time, and he was also doubtful of the patent. Yet the contract for £35,000, and a royalty of 1s. 6d. a meter on all made by themselves, was agreed upon without testing the validity of the patent; and the Committee decided to place a contract for a five years' supply of 20,000 meters. To safeguard the Committee, he had a clause inserted that the contract should be subject to the validity of the English patent, the Secretary to have the matter tested. Mr. Hilton consulted with Mr. Clark; but instead of instructing him to advise the Committee as to the validity of the English patent, Mr. Hilton and Mr. Foster, the Engineer at Windsor Street, and the gentleman who was to receive the contract for the French meter, went to Mr. Clark with new ideas to assist in rigging up a new patent. He asked if members of the Council thought that a proper procedure. It was a misdirection altogether, and what he called a piece of "dodgery." He regretted to have to charge the Gas Department with favouritism and preferential treatment; but why did they advertise for tenders for 12,000 meters and increase the contract to 20,000, and why did they advertise for a three years' contract and extend it to five? Never had the Gas Committee taken a contract before unless it had been thoroughly tested and tried, and it was a bad business to act as the Committee had done. The representative of the French meter had the privilege of having the defects pointed out to him, and having them put right; and this was where it was claimed that the French meter was the best. They would be told that all this was done to break down the meter-ring. He had no objection to breaking-up the ring—in fact, he had done his best to assist. But when it was proved there was no patent in the meter, the ring was already smashed, and when this was done their local and English manufacturers ought to have had a chance. The breaking of the ring could have been accomplished without the adoption of the unbusiness-like methods that were adopted. He contended that the Gas Committee had thrown away £5300. Releasing the representative of the French meters from taking the old meters, as arranged, was equal to 5s. a meter, or £3000. They had also lost 3s. 9d. a meter on 12,000 meters, which was £2250. No business firm would have acted as the Gas Committee had done; and, in his opinion, the Chairman and all those who had had a hand in the matter were deserving of the strongest censure. In his opinion, the Chairman of the Gas Committee should resign after this business.

Alderman Sir Hallewell Rogers's explanation had the effect of inducing the Council to adopt the report. His statement substantially was that local manufacturers had formed a ring to keep up prices; that the contract had been placed at a saving of 2s. 6d. per meter, as against local quotations; and that the validity of the patent was guaranteed by the English manufacturers. Sir Hallewell protested against the allegations of "jobbery and dodgery," and said he was willing to face an inquiry, suggesting that the result would be not a request for his resignation, but for that of other members of the Committee.

The subject was again referred to yesterday at a meeting of the Gas Committee, which was held under the presidency of Sir Hallewell Rogers. On the motion of Alderman Sanders, seconded by Alderman Lloyd, the following resolution was carried:—

> That the members of the Gas Committee very much regret the attack made on the Chairman and officials by one of its members at the last meeting of the City Council; they wish to express to Sir Hallewell Rogers and to the Secretary and Manager (Mr. R. S Hilton) their unabated confidence and regard, believing that what was done by the Committee in the matter which was the subject of the attack was in the best interests of the department.

Aldermen Sanders, Lloyd, and Bewlay, Councillors Todd, Charles, and Talbot voted for the resoluion, and Councillors Stevens and Gregory refrained from voting. A letter was read from Councillor Auster, the only member of the Committee not present, supporting the resolution.

In the course of an interview after the meeting, Councillor Stevens said he challenged the Chairman or any member of the Committee to meet him on any public platform in the city and discuss the subject of meter contracts with him. Moreover, he had given notice to the Town Clerk that at the next meeting of the City Council he should ask for an independent inquiry into the business of the gas-meter contracts.

The *agenda* for the meeting of the City Council to-morrow contains the following notice of motion in the name of Mr. Stevens: "That a Committee of seven members (independent of the Gas Committee) be appointed by the City Council to inquire into the whole business of the meter contracts during this year, and to report to the Council thereon; that any member of the Gas Committee be allowed to attend the meetings of this inquiry, and to examine witnesses and give evidence. The following points to form part of the inquiry:

1.—Why were the drawings and specifications of the French patent not examined and tested before the proposal was made to place the contract?
2.—Why was a royalty of 1s. 6d per meter offered before testing the validity of the patent?
3.—Why were all invitations to tender not on the same basis?
4.—Why were 20,000 meters proposed to be placed with a firm, when the invitations to tender were for 12,000?
5.—Why was the instruction of the Committee to have the validity of the patent tested not carried out?
6.—Why did the Secretary (Mr. R. H. Hilton) and Mr. J. Foster (the Engineer at Windsor Street) go with the representative of the French firm to Mr. Dugald Clerk to try and arrange a new patent when the old one had failed?
7.—When it was found there was no protection in the old patent, how was it that the whole of the contracts were not thrown open to general competition?
8.—How was it that the proposed contract of April 14 for 20,000 meters was afterward reduced to 12,000?
9.—Why were the representatives of the French firm (without consulting the Committee) released from taking an equal number of old wet meters?

That all books, letters, papers, and documents relating to these contracts, before and after the contracts were placed, be open for examination and inspection of the Committee of Inquiry and members of the Gas Committee."

GAS SUPPLY OF BLANTYRE.

The Middle Ward District Committee of the Lanark County Council, at their last monthly meeting, had before them a long report by the Sub-Committee appointed to inquire into the desirability of the Local Authority establishing gas-works for the supply of gas to the areas under their jurisdiction, or some of them. The minutes stated that the Committee had resumed consideration of the report made by Mr. Henry O'Connor with respect to the Blantyre Gas-Works, and the desirability of the Local Authority acquiring them and undertaking the supply of gas in the Blantyre district. After full discussion, the Sub-Committee were unanimously of opinion that it was desirable that the Local Authority should themselves become the undertakers for the supply of gas for public and private lighting in the Blantyre district. The meeting were satisfied that, on the information and advice submitted by Mr. O'Connor, the Blantyre area was a suitable one for the Local Authority undertaking the supply of gas; and they recommended that the District Committee should agree to the proposal. Having regard to the technical difficulties which might arise under the operation of the Burghs Gas Supply (Scotland) Act, 1876, and to the fact that, in formulating suitable proposals for the district, other and additional powers to those of the General Acts might be required, the meeting were of opinion that it would be the more expedient course to follow to promote a Provisional Order; and they advised accordingly.

The Committee also submitted a report by Mr. O'Connor with

regard to the area of supply of the Carfin, Newarthill, Cleland, and Districts Gas Company, Limited, dealing with the capital and position of the Company, the value of their works, and the question of the Local Authority becoming undertakers for the supply of gas in the district at present being served by the Company. After consideration, the Committee were of opinion that it was not opportune at the present time to advise that the Local Authority should undertake the supply of gas in the area in question.

The Sub-Committee's recommendations were, after some discussion, agreed to by 23 votes to 5; and the matter will now be dealt with by the County Council.

REFUSE DESTRUCTION AND ELECTRIC LIGHTING.

Proposed Scheme for Rothesay.

At a Special Meeting held recently, the Rothesay Town Council had under consideration the question of introducing a combined system of refuse destruction and electric lighting. The matter had been brought before them by Mr. James Robertson, M.I E.E., of Greenock, in a report which had been circulated; and he was in attendance to explain the various points, of which the following were the principal: (1) The capital cost of a suitable destructor and the cost of operation compared with the cost of the existing system of refuse disposal. (2) The question of combining with the refuse destructor an electric supply system for public and private lighting purposes. (3) The question as to how far the existing plant can be utilized for such a scheme. (4) The financial results to be expected if a combined scheme is proceeded with. The report gave an average of 15 tons of refuse per day, which was considered to be sufficient to provide, by the heat generated, not less than 30 to 40 units of electricity per ton consumed.

Mr. Robertson pointed out that he had allowed for the fact that the current sold at Rothesay would be almost entirely used for lighting purposes. Better results were, he said, obtained elsewhere; and at Greenock, where they had a large power demand, the average return during the last five years exceeded 70 units per ton of refuse destroyed. The 35 units per ton was arrived at from figures from other places working under like conditions. Taking Llandudno, for instance, where there was a combined system, they obtained more than 40 units.

Bailie James M'Millan put a number of questions to Mr. Robertson, and elicited the confession that he had not seen the refuse at Rothesay; but he supposed it would be of pretty much the same quality as at Largs, with which he was acquainted. Bailie M'Millan pointed out that it varied from day to day, and that two carts out of fourteen went up every day with paper and paper boxes. Not more than 10 tons of refuse went to the coup daily, as compared with 15 tons stated in the report. Mr. Robertson replied that the figures he had from the Burgh Surveyor were 12 tons as a minimum and 21 tons as a maximum; the average being 15 tons. On being asked by Bailie M'Millan if there would be any saving by having a destructor erected without an electric lighting scheme, Mr. Robertson replied that it might reduce the cost of the destructor by £400, £500, or even £600. The Provost (Mr. Fisher) remarked that if they put up a destructor alone, 150 units of electricity would go off into the atmosphere instead of being utilized. Bailie M'Millan said that in order to get the benefit they had to spend a lot of money. An electric light installation in Rothesay would never pay. He asked Mr. Robertson how he arrived at 40 as the number of consumers, and inquired as to the cost of fitting up a hotel with 40 bedrooms. Mr. Robertson said he thought they might assume that hotels would be bound to take the electric light if a public supply was given. The cost varied from 12s. to 22s. per point. In one hotel mentioned, it might cost £60 to £70, or if with wood casing £40. A shop with 15 lights could be done for £10. He felt perfectly certain that they would have 40 consumers. Bailie M'Millan pointed out that the shops in Rothesay were closed at seven o'clock in the winter, and remarked that to householders the electric light would be of little use if they could get gas at one-third less cost. Mr. Robertson replied that they could not get gas in Rothesay to compare, light for light, with electricity at 4d. per unit. Bailie M'Millan said their experience with electric light had been very unfortunate. They were paying £20 4s. 8d. per lamp for it, while each gas-lamp only cost £2 16s. 4d. He asked Mr. Robertson how he accounted for this. Mr. Robertson said they had an electric light system which was not the most suitable for the conditions existing at Rothesay. They had an obsolete type of lamp, and they had to keep a staff and bear all the standing charges that would be incurred by a much larger installation. Bailie M'Millan said the electric lamps were on for only three hours, and the gas-lamps for eight hours, yet there was all this difference in cost. The Provost remarked that one could not compare an electric lamp of 2500-candle power with a gas-lamp of perhaps 40-candle power. Bailie M'Millan said it ought to be "scrapped;" it was a disgrace to the town.

Mr. Robertson submitted a list of towns somewhat similarly circumstanced to Rothesay. At Colwyn Bay, with a resident population of 12,000, the number of units sold was 296,594; and the net profit was £228. The price was 4d. per unit. St. Anne's, with 10,000 of a population, sold 870,692 units, of which 420,000 was for traction, leaving about 430,000 units for lighting; and the price was 3·7d. per unit. Tonbridge sold 341,981 units; and Worksop, 401,000 units, with a net profit of £717. Rhyl, with 181,000 units, and a price of 4¼d., showed a deficit of £715. Mr. Robertson said someone had sent him a copy of a local paper with a cutting in it from a gas paper, containing an article dealing with the case of Whitehaven. He knew the sort of articles which appeared in the papers championing gas; but this one was rather worse than anything which had yet appeared. Whitehaven began very early—in 1893. After ten years, a portion of the plant required to be renewed, and they obtained a loan for the purpose on condition that they wiped off the old expenditure. Whitehaven was now free from the burden of the old debt, and finished the past year with a profit of £779. Another case instanced was that of Broughty Ferry, which had been earning a small profit yearly after paying interest and sinking fund. The price was 5¼d. per unit. Bailie M'Coll thought Mr. Robertson must admit that Broughty Ferry was not very creditable. Mr. Robertson said he did not admit it. He did not think any town of this size could expect more. Reverting to Rothesay, he remarked that if they wanted brilliant street lighting they could have it, or if they wished for quiet lighting only they could have it. He proposed to restrict the lighting to the area in their Provisional Order, with the addition of one street. If they were asked to go into other streets, they could demand a guarantee. He thought that they could have a combination of brilliant and quiet lighting.

With regard to the price, Mr. Robertson said 4¼d. per unit could easily be obtained in a town like Rothesay. On the other hand, if they wanted to popularize it, and make it as cheap as, if not cheaper than, gas, 4d. per unit would do. It was quite as cheap as gas at 2s. 7d. per 1000 cubic feet. They had many cases where there was a saving of 20, 25, and even 30 per cent. by introducing electric light. The Provost pointed out that while the charge to private consumers would be 4d. per unit, for street lighting, it would be only 2d. The present system was costing them 7d. per unit. Bailie M'Millan said he was quite convinced that the price under the proposed scheme would not be 4d. per unit, but 5¼d. like Broughty Ferry, because they would not get a sufficient number of consumers.

The meeting then closed.

STRIKE AT THE STOCKPORT GAS-WORKS.

The men employed in the Stockport Gas-Works struck on Saturday, demanding improved conditions and the abolition of non-union labour. They were informed that the Corporation could not interfere in the non-union question, but were prepared to look into the other demand. A deputation from the men appeared on Friday night before the Gas Committee, who stated that they would consider the grievances of each section of the workers separately. The deputation declined this, and 300 men ceased work.

On Saturday and Sunday nights the streets of the town, except those served by the electric light, were in darkness; the lamplighters having joined the other workers on strike. Owing to the low pressure, householders in many districts were unable to get any gas in their houses, and there was consequently a great demand for candles and oil lamps. The users of gas-stoves were also much inconvenienced. Yesterday there was about two days' supply of gas in store, and notices were sent round to the firms employing gas for manufacturing purposes to exercise all economy in the use of it.

At a largely attended meeting of the men held on Sunday night, it was decided that the strike should continue. Mr. J. T. Jones, the District Secretary, intimated that the Gas Committee had offered to meet the representatives of the employees to discuss the situation; and he strongly advised the men to return to work and give him the opportunity of proceeding with the negotiations for improved conditions of service and advances in wages. However, a great majority voted against this course; and Mr. Jones informed them that the responsibility for the strike must rest with the men themselves and not with their officials.

LEEDS CORPORATION ELECTRICITY UNDERTAKING.

Local Government Board Inspector on the Formation of Reserve Funds.

At the Town Hall, Leeds, last Thursday, Mr. H. R. Hooper, M.Inst.C.E., conducted an inquiry into an application made by the Corporation to the Local Government Board for sanction to borrow £168,500 for the purpose of developing the electricity undertaking. There was no opposition to the application; but the proceedings are of interest, as in the course of them the Inspector criticized the present financial methods of the Corporation.

The Town Clerk (Sir Robert E. Fox), in placing the scheme before the Inspector, said that during the coming winter it was anticipated that the load required on the electrical service would be 13,000 kilowatts, and that during the winter of 1914 (including the load for the tramways) 20,000 kilowatts would be needed. It was absolutely necessary that the Corporation should proceed at once to put down new plant. The present plant would, of course, remain as a stand-by. The £168,500 was to be allocated as follows: Machinery, £38,500; mains, £100,000; sub-stations, transformers, &c., £30,000.

Mr. *C. N. Hefford*, the Corporation Electricity Engineer, having given evidence,

The Inspector said it was apparent that the day was not far distant when a good deal of the plant originally installed would be of no further use, commercially or otherwise. This being so, with regard to both buildings and plant, there would probably be a considerable sum of money that would be outstanding during the next few years, when it would be necessary to make provision for the new plant.

In reply to the Inspector,

The Town Clerk said that no works or machinery were to be superseded as a result of the present application.

The Inspector: Your reserve fund is but a paltry £3000—it is scarcely worth while considering—and apparently there has been no tendency during the past three years to increase it. In 1907, there was a reserve fund of close upon £14,000; now it is less than £3500. Against this, the profits in 1907 were £3400; and in 1913 they were £15,500.

The Town Clerk explained that the Corporation had completed a financial rearrangement, owing to difficulties experienced from having two kinds of rating systems—the consolidated and the city rates. The reserve fund was abolished in this process, and it had been possible to make each rate "stand its corner," so to speak.

The Inspector said he was looking at the matter from a commercial point of view. The Corporation were putting in very large boilers that would in effect supersede the old Lancashire boilers. The fund for this purpose ought to have been built-up in previous years from

profits earned. When the day arrived to supersede the old boilers, what was going to be done? It was a doubtful question whether it had not arrived now. If the Board allowed this to pass on the present occasion, it was not a matter that could be met at a future time. This expenditure to supersede machinery must be anticipated and provided for. He would advise the Board that this was not a case of superseding, but that it would be a case of superseding in a few years. Yet it was "drawing the long bow" to say that the time to provide for the expenditure in the boiler-house had not arrived to-day, and that there were no funds to meet it.

The TOWN CLERK said that what the Corporation had done was quite legal; but at the same time what the Inspector had said would be useful to them. The Corporation had dealt with the reserve funds as part of the general scheme in rearranging the rating basis, and when the time arrived they would have to provide money to meet the situation.

The INSPECTOR pointed out that this might mean a great increase in the rates in one year; and the point was one which could not be much longer put off.

The TOWN CLERK called the Inspector's attention to the extremely prosperous state of the undertaking, and said he was anticipating much greater profits in the next and the following year. The Corporation would then have an opportunity of taking some proper action in the direction suggested.

The INSPECTOR said he hoped they would embrace the opportunity.

The inquiry then closed.

RENT FOR LAYING COMMUNICATION-PIPES.

The question of the annual rent to be charged on owners for laying communication-pipes and other necessary works for the supply of water to houses of, and under the annual rental value of, £10, under section 44 of the Water-Works Clauses Act, 1847, has lately been engaging the attention of the Hinckley Rural District Council. Counsel's opinion on the matter has been taken, and it is as follows:

The rent is for the use of the pipe, and it is a rent as long as the pipe is used for the conveyance of water to the house. In this sense it is permanent. Section 46 speaks of the "balance" of the principal money; but the section there applies to the balance after deducting the value of the pipes, &c. The material sections do not expressly authorize an annual payment towards the principal; but in estimating the annual rent, I think the life of the pipe must be taken into account—in other words, depreciation. Whether the item is regarded as depreciation or revenue, it really makes no difference, as substantially the result is the same. The rent will therefore represent an annual return by way of interest on the capital outlay, *plus* the estimated annual average cost of repairs and depreciating or renewal. An item representing a repayment of the capital outlay cannot be included in the rent.

The rate of interest should be the sum at which the Council can borrow. The Council would, I think, be entitled to charge an additional sum to represent book-keeping, &c.—in other words, establishment charges. The rent should be such a reasonable sum that the Council will not be out of pocket by the transaction. It is reasonable, therefore, to include such a sum as will embrace establishment charges. If the principal is repaid to the Council, and the rent is no longer payable, the subsequent repair and upkeep will fall on the owner or occupier.

The Water Committee of the Council have decided to recommend that the annual rent be 15 per cent. on the cost.

CHESTER GAS COMPANY'S PROFIT-SHARING SCHEME.

A General Meeting of the Profit-Sharing Employees of the Chester Gas Company was held last Thursday, under the presidency of Mr. JOHN M. FROST, the Chairman of the Company.

In their report, the Committee expressed their gratification at stating that the year ended the 30th of June had been very satisfactory from most points of view. The number of employees benefiting was 86—the largest since profit-sharing was introduced; and the amount withdrawn had been very limited. The bonus for the year was at the rate of 7½ per cent. During the year, £200 of stock had been transferred to profit-sharers, making the aggregate amount of £1510 of stock purchased under the scheme since its inauguration; and, in addition, there was a sum of £1157 standing to the credit of profit-sharers on the 30th of June. About half of them had sufficiently large balances standing to their credit to enable them to purchase £10 or more of the Company's stock.

The CHAIRMAN, in moving the adoption of the report, congratulated his audience on being employed in an industry which afforded peculiar facilities for co-partnership. Looking thoughtfully into the accounts and over the record of the twelve years they had been working together under the scheme, he maintained that anyone must be impressed with what could be accomplished by patience, industry, and thrift. It would be seen from the report that, when the accounts were made up, the employees had balances due to them amounting to upwards of £1150, in addition to which stock had been purchased to the value of £1660. So that, apart from benefits received from sums withdrawn for other purposes, the employees had now nearly £3000 deposited with, or invested in, the Company. Some of the "other purposes" for which money had been withdrawn were right and beneficial ones; and in not a few cases it was of considerable relief in sickness and bereavement. The financial result achieved was not the only beneficial one. The scheme encouraged healthy ambition, and furnished a practical example

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BIRMINGHAM.

of the reward of constant care and genuine effort. Each individual employee should rightly give first thought to his own advancement; but in order to secure the fullest benefit to his efforts, he must exercise such consideration for those with whom he was employed as to ensure the most harmonious working possible, so that the result of their joint efforts might be fully successful. It was only by encouraging this feeling of mutual assistance and good fellowship that the scheme would develop as successfully as it might and ought to do. He asked his hearers to consider seriously this point—that the bonuses must not be looked upon as wages. They were supposed to be part of the extra profits earned by the employees owing to more intelligent interest taken by them individually and collectively in their employment; and the Directors were satisfied that, broadly speaking, this supposition had been realized in the past. But there were periods in all phases of life when it seemed more difficult than at other times to keep up lively interest and energy; and perhaps, now that they had done so well as to get the price of gas down to 2s. 6d. per 1000 cubic feet and so secure a bonus of 7½ per cent. (which was equal to very nearly four weeks' extra wages or salary), there might be a reaction, and a temptation to slacken off a little. If any of them should feel any tendency this way, he would suggest the thought that, apart from any detrimental effect on themselves, they would, by yielding, be failing in their most honourable duty to their fellow-employees, and would risk the loss of a brilliant example to employers generally of what might be done by co-operation; for they must take it as certain that the profit-sharing scheme only lasted so long as it justified its existence. In conclusion, the Chairman pointed out that, under existing conditions, any possibility of further reducing the price of gas and increasing the rate of bonus, or indeed, of maintaining it at the present rate, would be more than ever dependent on the successful energies of the whole of the employees.

The motion was carried by acclamation; and votes of thanks to the officials for their voluntary work, and to the Chairman for presiding, brought to the close a very hearty meeting.

PLYMOUTH WATER SUPPLY.

Need of Additional Trunk Mains.

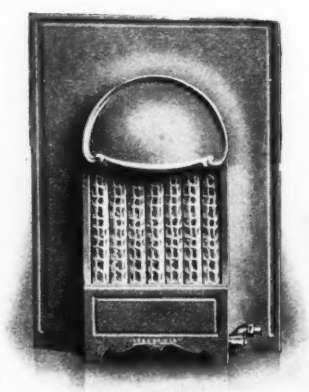
Reports on the prospective requirements of the district supplied with water by the Plymouth Corporation were presented to the Water Committee last Friday by the Water Engineer (Mr. Frank Howarth, M.Inst.C.E.) and the Town Clerk (Mr. J. H. Ellis). Mr. Howarth, in his report, points out that the population in the area of supply has increased from 132,279 in 1903 to 142,694 in the present year. If the increase continues at the same rate, the population thirty years hence will reach 185,500. The average daily consumption of water is 6,175,000 gallons, or 43 19 gallons per head; and the maximum demand in a dry season is 20 per cent. more than the average throughout the year. On the basis of an average consumption of 40 gallons per head *plus* 20 per cent. as a maximum, the future demand will rise to 9 million gallons per day. At present the means of conveying water from the storage reservoir at Burrator to the first of the distribution reservoirs at Roboroughs is a 25-inch main, with the open leat as an alternative. The original capacity of the main was 7,750,000 gallons per day; but this has been reduced to about 6,100,000 gallons by incrustation and deposit. As the average daily demand is in excess of this, and rises on occasional days to as much as 7,500,000 gallons, it has been necessary to put out of action the screen chamber at Burrator, and place the main under direct reservoir pressure. One effect of this has been that the deposit in the main has increased at a more rapid rate.

The use of the open leat as an alternative or additional means of supply is open to the objections that in wet weather it forms an intercepting channel for surface water throughout its entire length and is consequently subject to pollution, during periods of frost and snow it cannot be relied upon, and finally that the loss by leakage is very great. To provide for the future it would be necessary either to lay a second pipe-line across country or reconstruct the leat in the form of a covered aqueduct or by a reinforced concrete pipe along its course. If a second pipe is laid, it should be large enough to convey of itself the quantity of water required in the future, and to allow for incrustation. A 30-inch pipe would convey 12,500,000 gallons per day, which would be reduced to about 10,000,000 gallons in twenty years' time. At the present high prices, the estimated cost of a 30-inch cast-iron main is £48,000, and of a steel main £44,000. The steel main is the cheaper and would stand the tensile stresses much better than cast iron; but if not very effectively protected it would corrode much more quickly. The length of the leat is 11,737 yards, compared with 7703 yards of pipe-line. If the leat were to be reconstructed in concrete, it would be necessary to flatten the existing gradients or line the aqueduct with some harder material, because concrete work would suffer from the excessive scour. A more practicable plan would be to lay a reinforced concrete pipe below the present bed of the leat, and utilize the spoil in filling-up to about the present level of the banks. The estimated cost is £43,000.

The Town Clerk, in his report, points out that a considerable time must elapse before any scheme can be carried out. In the Plymouth Corporation Act, 1893, land and easements for the laying of a second line of pipes were acquired; but the power for the execution of the works expired in 1900. It will therefore be necessary to revive the power by Provisional Order or Private Bill. This difficulty would not arise if the Engineer's second alternative of making a new aqueduct along the leat were adopted, for the Plymouth Corporation Water Act, 1867, contained all necessary powers except those to raise the money.

The Committee passed a resolution expressing the opinion that the time has arrived when steps should be taken to supplement the existing means of conveying water, and referring the matter to a Sub-Committee to confer with the Water Engineer as to the best means of doing so.

THE "MAIN" AIM.



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NEW WATER-WORKS FOR CLOWNE DISTRICTS.

Opening Ceremony.

The parishes of Barlborough, Clowne, Creswell, and Whitwell, constituting the area of the Clowne Rural District Council, were last Wednesday formally put in possession of a new water supply, which has been carried out at an estimated cost of £41,500. The inaugural ceremony was performed by Mr. J. P. Houston (Mayor of Mansfield), who, as the Managing-Director of the Bolsover Colliery Company, represents the largest ratepayers in the district. The proceedings marked the consummation of a project which has been more or less under consideration for about twenty years. The scheme is the outcome of an arrangement arrived at by the Parish Councils of the four places already named.

The supply is derived from the pumping well of the Wigan Coal- and Iron Company at their Manton Colliery. It is new red sandstone water, with a hardness of 14° to 15° per gallon, and the analyst's report speaks of the water as "extremely pure and suitable for public supply." The available quantity at Manton is 2 million gallons per day; and the scheme provides for an increase of population from 18,000 to 27,500, requiring 412,500 gallons daily. The agreement with the Wigan Company, and the pumps and mains, provide for a maximum of 500,000 gallons. The water is pumped from a depth of about 270 feet below the ground level to a reservoir on Sparken Hill—the highest point in the neighbourhood—from which it gravitates to Hodthorpe, where duplicate sets of compound condensing steam-engines have been installed. These force the water through 6¾ miles of main to a reservoir holding 400,000 gallons near Barlborough, and also to a water-tower in the village—the maximum lift being 410 feet. The tower, which rises 65 feet above the ground, is an elevated circular steel tank, with hemispherical bottom and domed roof, and was made and erected by Messrs. Newton, Chambers, and Co, Limited. The tank holds 40,000 gallons.

In dividing the capital cost of the works among the various parishes, all works of obtaining, pumping, and storing the water and delivering it to centres of population are considered as being for the joint benefit of all; and this cost is averaged among the parishes on population and rateable value. Each parish bears the cost of its own distributing mains, which are about 18 miles long, and bring the total length of mains to 30 miles. The water is sold to the parishes at the actual cost price, and the expenses of maintenance will be divided as in the case of the capital outlay. The cost of the water is 8d. per 1000 gallons at the parish meters, and 10½d. on the consumers' premises.

Outside the pumping-station at Hodthorpe, Mr. S. Evans (the Chairman of the Clowne Rural District Council) explained the negotiations leading up to the formulation of the scheme, and congratulated the Engineers (Messrs. G. & F. W. Hodson, of Loughborough) on having kept so well within the estimates as to provide a small surplus.

Mr. F. W. Hodson handed an inscribed silver key to Mr. Houston, and with it the doors were unlocked. In declaring the pumping-station open and starting the machinery, he said there was an unlimited supply of water available for the whole district in the new red sandstone formation; and in this connection he mentioned that at Rufford Colliery 7½ million gallons of this water was running to waste every 24 hours.

At a subsequent luncheon, the toast of "Success to the Clowne new water-works" was heartily honoured.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

The transfer of gas undertakings to local authorities is proceeding n many parts of the Scottish area. Motherwell, Lanark, and Bridge of Allan are all well forward with their schemes, and now we have Kinross anxious to acquire the undertakings of the Kinross and Milnathort Gaslight Company. The Company light both Kinross and Milnathort. The latter place is not a burgh—its administration being in the hands of the County Council; and we may find that this body will oppose the scheme. A memorial was submitted to Mr. Avon Clyde, K.C., M.P., whose opinion was favourable. Provost Alles made the usual motion that the Burghs Gas Supply (Scotland) Act, 1876, should be adopted and applied to the burgh of Kinross, and that Tuesday, Nov. 18, should be appointed for the second special meeting to resume consideration of such resolution. This was carried unanimously. Then we find that the Inverkeithing Town Council also wish to acquire the concern of the Inverkeithing Gas Company; and, after a discussion in private, the Town Clerk (Mr. J. R. Menzies) stated that the following resolution had been adopted: "That the Burghs Gas Supply (Scotland) Act, 1876, be adopted in, and applied to, this burgh, and that Thursday, the 27th day of November, at eight o'clock p.m., within the Town House of Inverkeithing, be appointed for holding a second meeting of the Council to resume consideration of this resolution." There being no amendment, the Provost declared the resolution unanimously carried. There is only one point in regard to this statement, and that is that a number of councillors are also either directors or shareholders of the Gas Company, and, of course, they could not vote upon the resolution. It would be interesting to hear what they have to say in the matter. This question was before the Council several years ago, prior to the Gas Company spending a large sum of money upon the works; but the price offered by the Council was much too small for the Company to accept. The works are now in a thoroughly sound condition, and quite up-to-date; while the district has been laid with pipes wherever the supply has been desired in sufficient quantity. Next the District Committee of the Middle Ward of Lanarkshire have decided to acquire the gas-works of the Blantyre Gas Company, on the unanimous recommendation of the Committee appointed and the

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expert's report. This has to be ratified by the County Council in full, and then a Provisional Order will be lodged, as this will give better powers than could be obtained under the Burghs Gas Supply Act. [Details of this scheme will be found on another page] The Town Council of Haddington have also adopted the Burghs Gas Supply Act, and are to hold a further meeting, after the November elections, to ratify the scheme. In this connection, a letter has appeared in a local paper advocating the application to one or other of the companies specializing in lighting small towns by electricity; but the correspondent does not give the fate of those small towns where electricity has been installed at the expense of the ratepayers. If electric lighting were the paying thing, we might believe, from such a letter, capitalists would long ere this have arranged for the installation of suitable works in all such small towns. It might be mentioned here that while the papers will print any facts and fancies about electricity, they will rarely insert anything about gas. Why is it? Perhaps they understand, or think they do, all about gas; but the wonderful word "electricity" carries with it some scent of the unknown.

Dundee are determined not to stand still. Not satisfied with having annexed Broughty Ferry, they are now to undertake the working-up of their own tar. In the past they have sold this at a rate per 100 gallons, based on a sliding-scale, according to the selling price of the products. The contracts for this, which have usually been for five years, are about to expire, and this is thought to be a favourable opportunity for making the alteration. Mr. Yuill has made a report upon the matter, and states that there is no doubt it would be to the advantage of the Gas Commissioners were they to acquire ground and lay down plant for the purpose. The economic developments of the gas industry with regard to residual products are tending in the direction of the gas authorities themselves extracting all the more valuable constituents, either at the gas-works or as near as possible, instead of, as formerly, selling the raw material, and incurring heavy expense for carriage. For the first year or two he does not propose to go in for the extraction of the tar oils to an exhaustive extent, but to confine himself to the production of benzol, toluol, solvent naphtha, crude carbolic acid, naphthalene, creosote oil, anthracene oil, and pitch. After deducting the cost of labour and material, he calculates there would be a margin of profit of about £1500. There was some discussion at the meeting on the question of municipal trading, though why there should be any objection to the Gas Department selling the products, when they already sell the tar itself, is a matter that only those councillors can answer who invariably object to any municipality dealing with anything which might be worked by individual effort. Questions as to capital cost were asked, and the Chairman put it at £4500, without allowing for the site, which he stated they could obtain from the Harbour Board at 12s. 6d. per pole, making a total of £125 per year. A further question was put as to the intention as regards the working-up of the products from other gas-works; and Mr. Yuill referred to the severe fight in Parliament nine months ago, and the decision that gave municipalities full power to manufacture their own residuals, and to purchase from and deal with another corporation. The Lord Dean of Guild mentioned that they were up against a "ring" in trying to dispose of their residuals, and it was suggested that the £1500 might in a few years become £3000. The proposal was unanimously agreed to, and powers are to be sought from Parliament. The vertical retort tenders were also considered, and that of the Woodall-Duckham Vertical Retort and Oven Construction Company, London, amounting to £32,869, was accepted. The saving by the use of vertical retorts was stated to be 5d. per ton, as the cost was only 5d. as against 10d. for horizontals.

Excellent notices of the National Congress and Exhibition have appeared in the principal Scottish papers, generally in letters from the London Correspondents, which is the first part of the paper to which attention is usually given. These letters do far more good than any number of advertisements, however well worded, and they are sure of a reading. That the Congress will have good attendances from the Provinces is certain, as numerous inquiries as to dates and matter to be discussed have been made from representatives from various municipalities and corporations, who are to be sent to learn all that is latest and best in the way of gas usage.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Sept.* 27.

Sulphate of Ammonia.

The requirements for September delivery having been covered, the market for this article has become slower during the past week, but no reduction in values has been recorded. At the close quotations remain £13 12s. 6d. per ton f.o.b. Hull; £13 13s. 9d. per ton f.o.b. Liverpool; and £13 15s. per ton f.o.b. Leith. There has continued to be a fair inquiry for future delivery, and it has transpired that first-hand business has again been done at £13 15s. per ton for October-December, and at £13 17s. 6d. per ton for January-April delivery, f.o.b. best ports, in equal monthly quantities.

Nitrate of Soda.

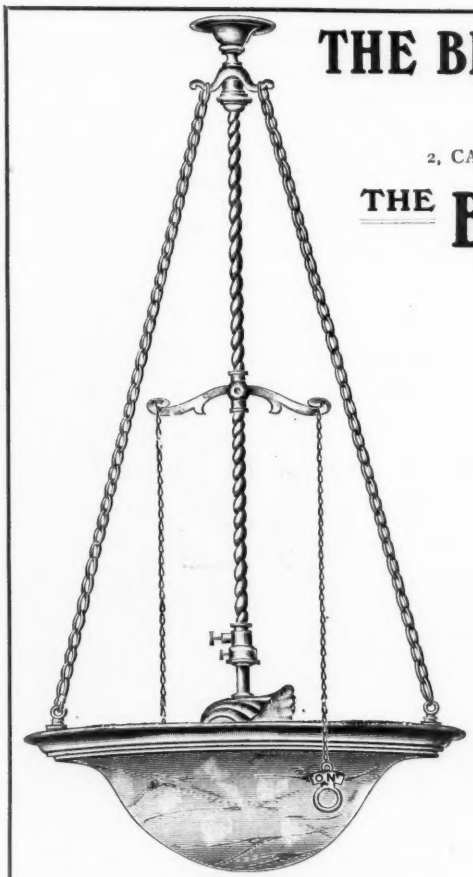
This market is still unchanged, and holders repeat their quotations at 10s. 9d. per cwt. for ordinary and 11s. for refined quality on spot.

LONDON, *Sept.* 29.

Tar Products.

There is nothing of particular note to report respecting the markets for tar products. Business is quiet; and it does not seem possible to make a move in any article at the present moment. Pitch remains about the same as regards price; but there is little or no business doing either for the prompt or forward position, and consumers appear to be holding well off the market. Benzol is firm, and a fair amount of business has been done in the 90's quality. Solvent and heavy naphthas continue very quiet. There is a good inquiry for creosote, and the price remains firm. There is no business doing in crude carbolic.

The average values during the week were: Tar, 29s. 3d. to 33s. 3d. Pitch, London, 44s. to 45s.; east coast, 44s. 6d. to 45s.; west



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coast, Manchester, 43s. to 43s. 6d.; Liverpool, 44s. to 44s. 6d.; Clyde, 44s. 6d. to 45s. Benzol, 90 per cent., naked, London, 1s. 1d. to 1s. 1½d.; North, 11½d. to 1s.; 50-90 per cent., naked, London, 1s. to 1s. ½d.; North, 11d. Toluol, naked, London, 10½d. to 11d.; North, 10½d. to 11d. Crude naphtha, in bulk, London, 5½d. to 5⅝d.; North, 5d. to 5¼d. Solvent naphtha, naked, London, 10⅛d. to 10⅜d.; North, 9⅛d. to 9⅜d. f.o.b. Heavy naphtha, naked, London, 10d. to 10⅛d. f.o.b.; North, 9d. to 9⅛d. f.o.b. Creosote, in bulk, London, 3⅜d. to 3½d.; North, 2⅞d. to 3d. Heavy oils, in bulk, London, 3⅛d. to 3⅜d. Carbolic acid, casks included, 60 per cent., prompt, east coast, 1s. 2⅛d. to 1s. 3d.; west coast, 1s. 2d. to 1s. 2⅛d. Naphthalene, £4 10s. to £10; salts, 50s. to 55s., bags included. Anthracene, "A" quality, 1⅛d. to 1⅜d.; "B" quality, nominally ¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market during the past week has been somewhat dull, though there has been very little buying going on; but prices have not really altered. Outside London makes are quoted at £12 13s. 9d. to £12 15s.; Hull, £13 8s. 9d. to £13 10s.; Leith, £13 11s. 3d. to £13 12s. 6d.; Liverpool, £13 10s. to £13 11s. 3d.; Middlesbrough, £13 10s.

A correspondent writes on the subject of pitch prices: Now that the warm weather shows some inclination to depart, the briquette manufacturers are making offers for their requirements of pitch, and there is no doubt about the market for this article being very firm, and buyers are willing to pay the current values for pitch, which he claims are as follows: Liverpool, 47s.; Manchester, 46s.; Glasgow, East Coast, and London, 47s.

Gasholder Fatality at Drogheda.—While William Finegan and Edward Carolan, employed by Messrs. Hanna, Donald, and Wilson, of Paisley, were engaged in the erection of a holder at the Drogheda Gas-Works, the scaffolding gave way, and they were precipitated to the bottom of the tank. Finegan died soon afterwards, and Carolan expired in hospital a few days later.

Gas Poisoning Accident at Preston.—A case of gas poisoning occurred at Preston on Saturday morning. The previous night Mary Bushall, of New Hall Lane, retired to rest with her three sons and her mother. As the mother and sons failed to appear at work on Saturday, the mill authorities sent messengers to the house. Repeated knocking failed to secure a response; and a chimney sweep obtained a ladder and entered through the bedroom window. The house was full of gas, and the five occupants were unconscious, suffering from gas poisoning. Two were removed to the Infirmary, where they lie in a critical condition. A gas official was summoned, and found a defective plate in the meter, which had given way. But for the mill authorities sending messengers to the house, the whole family must have succumbed.

COAL TRADE REPORTS.

Northern Coal Trade.

The coal trade is steady in general, and there is a good demand for prompt delivery, though new contracts are not so numerous. In the steam coal trade, best Northumbrians are about 14s. 9d. to 15s. per ton f.o.b.; second-class steams are from 13s. 3d. to 13s. 6d. per ton; and steam smalls are easier at 7s. 3d. to 8s. 10½d. per ton f.o.b. The output at the collieries seems now nearer the normal one at this time of the year. The gas coal trade is active, with the price again from 15s. per ton f.o.b. for best Durhams; 14s. per ton for seconds; and about 15s. 3d. per ton f.o.b. for "Wear specials." The contract for the Malmo Gas-Works has been allotted for Durham coals, and is, in the total, for 40,000 tons; but the exact prices to be paid have not yet transpired. Sales of occasional cargoes are being made for export, and there is a somewhat similar movement in prices to that reported last month—that is, firmness for the current year, with easier figures for further forward delivery. In the coke trade, business is steadier. Gas coke may be quoted from 17s. to 17s. 6d. per ton f.o.b. in the Tyne. With the fuller production, stocks of gas coke increase, more especially at inland works.

Scotch Coal Trade.

Throughout Scotland the conditions in the coal trade are practically the same as prevailed a week ago. On the Glasgow Coal Exchange, on Friday, the following were the approximate prices quoted: Ell coal, best brands, 13s. 3d.; splint, 13s. to 15s. 3d.; Navigations, 15s. to 17s.; steams, 13s. to 14s. 6d.; Hartleys, 15s.; trebles, 13s. 9d.; doubles, 13s.; singles, 11s. 6d.; pearls, 9s. 9d.; and dross, 8s.—f.o.b. Glasgow.

East Kent District Water Company.—At the ordinary general meeting of this Company last Wednesday, Colonel B. T. L. Thomson, who presided, said that the Directors recommended the payment of a dividend at the rate of 5 per cent. per annum, less income-tax, which would leave a balance of £682 to be carried forward. The progress of the Company had certainly been satisfactory. They had made an agreement with the Dover Corporation, whereby they had taken steps to see that the rights of the Company were not interfered with. The necessity for providing in the future for a larger water supply was also under consideration by the Directors. The Royal Assent had been given to a Bill which gave the Company power to take additional supplies of water when needed. With regard to the accounts, there had been an increase in the capital expenditure of £1322 during the six months under review, partly owing to mains laid, the completion of cottages, and the new Bill. The water-rate showed a small decrease of £81, due to the collieries in the district using less water when they had ceased boring. A small reduction of £65 was also to be noticed in wages, salaries, and coal, owing, in a measure, to less water being pumped. The report was unanimously adopted.

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"Degasco Cent. London."

Keighley Corporation Gas Supply.

The annual report of the Keighley gas undertaking, submitted to the Town Council last week, showed that the gross profits on the year's working amounted to £17,794, and after payment of interest, sinking fund in reduction of debt, &c., there remained a net profit of £8226. It was recommended that £6961 be transferred to relief of rates, leaving a net profit of £1265 and bringing the total surplus, including the balance of profit brought from last year's account (£9095), to £10,360. The Committee recommended the confirmation of the transfer to the rates, the granting of £50 to the Victoria Hospital, and the transference of £3000 to renewals and insurance fund—leaving £7310 to be carried forward. The receipts for the year had been £54,869. The Gas Engineer (Mr. W. Baillie) announced that they had again to pay a big price for coal, and this would have an adverse effect on the profits of next year. At present, the residuals showed a decided downward tendency; and the outlook for the future was not reassuring. In regard to working results, he was afraid they could not expect much further, if any, improvement with the present carbonizing plant, some parts of which showed great deterioration. He hoped in the near future to lay before the Committee a scheme of modern horizontal retort installation as compared with vertical retorts. The annual make of gas at present was 383,795,000 cubic feet, equal to 12,044 cubic feet per ton of coal carbonized. The gas sold and used on the works amounted to 372,254,702 cubic feet, leaving 11,540,298 cubic feet unaccounted for. The net profit per 1000 cubic feet of gas sold was 10·9d. The report and recommendations were confirmed.

Water-Works Contractor Penalized.—The Cahirciveen (co. Kerry) Board of Guardians have passed a resolution imposing a fine of £100 on the water-works contractor for his failure to complete the works within the specified time, and deciding to fine him £25 per week for every additional week until the works are finished.

Unprofitable Electricity Supply at Holyhead.—Details regarding what for many years has been regarded as Holyhead's "white elephant" were furnished at a meeting of the Union Assessment Committee last Wednesday, when Mr. T. R. Evans, the Clerk to the Holywell Urban District Council, applied for a reduction of the assessment of the electricity works to the poor rate. He stated that the works were at present assessed at £260. Since they commenced there had been a deficiency of £3910—an average of £500 annually, or a loss of £10 per week. Similar works at Carnarvon were assessed at £75 only, and at Bangor at £150. He suggested that the assessment should be reduced to £60. The Chairman (Alderman J. N. Thomas, J.P.) said he thought that the reduction applied for was really too much; and he asked Mr. Evans whether he did not think the concern would pay if the works were carried on by a company. Mr. Evans said he was afraid it was quite impossible. After some deliberation, the Chairman announced that the Committee would consider their decision.

The First Iron Water-Pipes.

In a recent number of "The Times" a statement appeared that there had been uncovered in Berners Street, Oxford Street, some wooden water-pipes which had been in use as recently as 1816—perhaps even a little later. Mr. John W. Ford, of Shalford, followed up the statement with an interesting letter, showing that in that year the Governor and Treasurer of the New River Company applied to Mr. Vansittart, the Chancellor of the Exchequer, when the iron trade was greatly depressed, for assistance to enable them to substitute iron pipes for the old elm ones. The Chancellor gave them a letter to the Bank of England, authorizing a loan of £100,000, on the condition that the money was expended in iron from the Staffordshire foundries. Extraordinary opposition was made to the substitution of iron for wood pipes—among the objections raised being one that the consumption of the water would produce cancer. Mr. Ford has furnished the "Ironmonger" with some further information regarding these pipes. He states that a relative, a Mr. John Walker, was the Governor of the New River Company when the bargain was struck with the Bank. Unfortunately, the books of the Company were destroyed by fire in 1820, and consequently exact evidence from this quarter has been lost. Mr. Ford thinks that probably some information on the subject may be lodged in the minutes of the evidence of Mr. Mylne, the Engineer of the Company, which he gave before the Water Commission in 1851. The estimated length of wooden pipes under the roads of London at the end of the Eighteenth Century was 400 miles, 20 miles of which had to be replaced annually. The leakage of water, even after this replacement, was calculated to be a quarter of the volume of water passing. The Company at that time were only able to supply water to a height of 6 feet, and every consumer had to fix a forcing-pump in his own house.

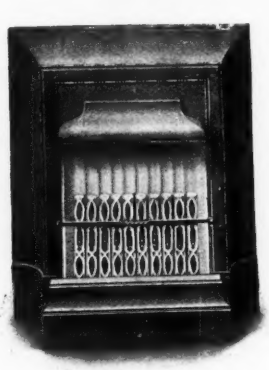
Additional Capital for the Wandsworth, Wimbledon, and Epsom Gas Company.—It will be seen, from an announcement appearing elsewhere, that the Directors of the Wandsworth, Wimbledon, and Epsom Gas Company are inviting tenders for £50,000 of new ordinary stock and £20,000 of 4 per cent. debenture stock; the minimum price of issue of the former being £112 and of the latter £94, per £100 of stock. Tenders must be for amounts of £50 of either stock, or multiples.

Welsbach Light Company.—The profit and loss account of the Welsbach Light Company, Limited, for the year ended March 31 shows a profit of £1788, which is carried to the balance-sheet—thus reducing last year's adverse balance to £3164. The Company, it is stated, have acquired an interest in the business of B. Cars, Limited, manufacturers of lamps and gas appliances. A dividend at the rate of 12 per cent. on the Company's holding in the Austrian Incandescent Gaslight and Electric Company, for the year ended March 31, 1912, is included in the accounts. For the year ended March 31, 1913, the Austrian Company's accounts, recently to hand, foreshadow a reduced dividend (6 per cent.), owing to the adverse conditions prevailing last year.

CARRON

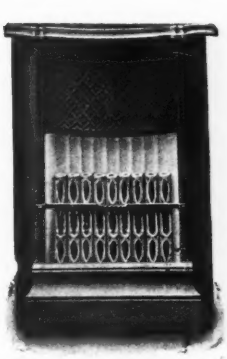
By Appointment
Ironfounders to H.M. the King.

GAS FIRES



"Abbey" Series.
The "DUNFERMLINE."

GAS MANAGERS who handle Carron Gas Fires know of the service and satisfaction they give, and the business they bring. Their increasing sale is the outcome of their proved value.



"Abbey" Series.
The "KILWINNING."

CARRON COMPANY
INCORPORATED BY ROYAL CHARTER 1773

CARRON, STIRLINGSHIRE, and Phœnix Foundry, Sheffield.

A complete assortment of CARRON manufactures on view at the Company's Showrooms :—

LONDON—(City) 15, Upper Thames St., E.C.; (West End) 23, Princes St., Cavendish Sq., W., and 3, Berners St., W.; LIVERPOOL—22-30, Redcross St.; MANCHESTER—24, Brazennose St.; BRISTOL—6, Victoria St.; BIRMINGHAM—218, 220, 222, Corporation St.; NEWCASTLE-ON-TYNE—13, Prudhoe St.; EDINBURGH—114, George St.; GLASGOW—125, Buchanan St.; DUBLIN—44, Grafton St.

An Acetylene Demonstration Van.

A new departure in advertising acetylene gas and oxy-acetylene welding is being undertaken by "Acetylene Publicity Limited," of Winchester House, E.C. They point out that for many years past the advantages of lighting houses, shops, churches, villages, &c., by acetylene light have been well advertised; "but it is obvious that an advertisement, however clearly it may be drawn up, cannot possibly convey to the reader the same impression as if he could see the light itself." Guided by these views, the Company have constructed (at a cost of approximately £1200) a special motor van, which, elaborately fitted up with different devices showing lighting and cooking by means of acetylene gas, is intended to be sent about the country to demonstrate the advantages to be gained from the use of acetylene light. The van is also equipped with a complete oxy-acetylene welding outfit; and it will call at manufacturing establishments in the country, to demonstrate the advantages to be gained by adopting the oxy-acetylene welding process. Beyond this, the vehicle is fitted with a cinematograph which will show, at various halls in the country, the manufacture of carbide from the carbide furnaces until its arrival in this country, and also some practical work executed by the oxy-acetylene welding process at the welding school in London.

Thirsk Water Supply.—The Directors of the Thirsk District Water Company are contemplating making an additional service reservoir, to hold about a full week's supply. The existing reservoir near Boltby has a capacity of 30 million gallons. Owing to the exceptionally small rainfall this year, the Company's largest consumers, the North-Eastern Railway Company, who use as much water for engines, &c., as all the other consumers put together, had to be cut off on the 16th of August, but this restriction was evidently not enough, for recently the Directors issued bills giving notice to consumers that the water would be turned off each evening at six o'clock until seven o'clock the following morning. It is more than twenty years since the supply was as low as it is now; there being only between 7 and 8 feet of water in the reservoir.

Gas Deposits at Salford.—It appears that a further concession to gas consumers in Salford is foreshadowed. At the October meeting of the Council, the Gas Committee will recommend that any occupier of a house in the borough shall be provided with a gas-meter free of charge, on the production of two satisfactory references. Thus will be obviated the payment of a deposit by new consumers. But the resolution, if ratified, will have another important effect. It is understood that the Borough Treasurer has no less a sum than £15,000 at his disposal, which has accrued from the system of deposits; and the resolution further provides that, on application, accompanied by two similar references, the whole of the deposits shall be refunded to the consumer. The proposal is stated to be receiving general approval, and its adoption by the Council is regarded as certain.

Manufacturers and Coal Contracts.

In the course of an "Editorial Note" in last Saturday's issue, the "Ironmonger" said: "It is becoming more evident every day that the coal market generally is weakening, and that in some directions there is already a decided reaction. In a previous article on this subject, we pointed out the advisability of exercising great caution in contracting for forward supplies at current prices, which were then roughly about 4s. 6d. per ton higher than those of a couple of years ago, especially as the cost of fuel forms no small percentage of the cost of production in the manufacture of hardware and of engineering requisites. A considerable number of contracts for fuel expire at the end of the present month; and while, generally speaking, the collieries in regard to forward business are firm on the question of prices, the market conditions do not appear to justify the prices that are being quoted for contract renewals. It is an open secret that, since the strike of 1912, there has been an arrangement among the colliery owners in practically all the principal producing districts to secure uniform advances; and after June 30 last year there was no difficulty in obtaining from 2s. to 2s. 6d. per ton extra, which was to cover the increased costs of production under the Coal Mines (Minimum Wage) and National Insurance Acts. It was not suggested that the whole of these increased charges would work out at anything like the advance in the price of coal—in fact, the trading results of the collieries since last midsummer fully prove this; but it was considered that the state of trade justified a substantial advance, which was enforced on practically every grade of coal. A further advance of from 1s. to 1s. 6d. per ton has been insisted on this year, and in many instances has been obtained; and it is specially desirable that manufacturers should now use more than ordinary caution when contracting for fuel, because, however firmly producers may stick together in a rising market, there is never the same cohesion in a falling one."

Llandudno Gas Supply.—At the meeting of the Llandudno Urban District Council last Friday week, the Chairman of the Gas Committee (Mr. T. Smith) informed the Council that in seven years the make of gas had increased from 70 million cubic feet to 90 millions.

Wakefield Corporation Water-Works.—The Wakefield Corporation propose to lay an 18-inch cast-iron water-main from New Scarborough to Waindyke, from a point on the north-west side of the city, close to the north boundary, through the urban districts of Stanley, Altofts, and Normanton, to Waindyke Bridge. The main, which will be nearly seven miles long, is required for the purpose of improving the pressure and delivering more water to the urban districts of Castleford, Featherstone, Whitwood, Normanton, and Methley, and to certain portions of the Tadcaster and Pontefract rural districts. Steel pipes will be used where the main crosses the River Calder, the Aire and Calder Canal, and some streams. The pipes over the Calder will be carried by the existing toll bridge owned by the Aire and Calder Navigation; and a steel bridge of 90-feet span will carry the pipes across the canal.

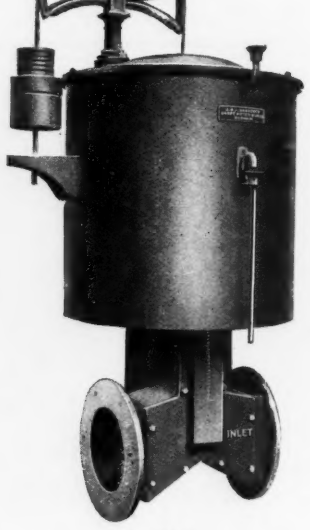
BRADDOCK'S RETORT-HOUSE GOVERNORS

HAVE PROVED TO BE

SECOND TO NONE.

Many repeat orders have been received.

Braddock's New Patent Retort-House Governor is a further improvement and is especially desirable for use with Vertical Retorts.



No. 284.
Braddock's New Patent Enclosed Retort-House Governor, Latest Type.

Further Particulars upon Application.

J. & J. BRADDOCK (BRANCH OF METERS LIMITED), Globe Meter Works, **OLDHAM.**

Telegrams: "BRADDOCK, OLDHAM." National Telephone No. 815.

AND 45 & 47, WESTMINSTER BRIDGE ROAD, LONDON, S.E.

Telegrams: "METRIQUE, LONDON." Telephone No. 2412 HOP.

Swinton and Mexborough Gas Undertaking.—The first full year's balance-sheet of the Swinton and Mexborough municipal gas-works provides pleasant reading for the ratepayers, showing, as it does, a gross profit of £4376. The quantity of gas made was 53,593,000 cubic feet. The expenditure was £3155. The present charge to consumers is 3s. 6d. per 1000 cubic feet for lighting. A reduction of 2d. per 1000 cubic feet is being made to users of over 100,000 feet per annum.

Londonderry Water Supply Extension.—At a special meeting, the Londonderry Corporation resolved to complete the scheme for bringing water from Buengallagh River, which was decided upon two years ago and was afterwards abandoned. Alderman Anderson, the Chairman of the Water Committee, warned the Council of the danger of a deficient supply if the scheme was not proceeded with, and Councillor Moorish said it would be an industrial disaster if the supply ran short even for a day. The City Surveyor was directed to report on a larger scheme, so as to settle the water supply question for a generation.

New Joint-Stock Companies.—The Somerset and Gloucester Gas-light and Coke Company, Limited, has been registered with a capital of £20,000, in £1 shares, to take over the freehold property known as the Niagara Mills, at Northstoke, five miles from Bath, to carry on the business of gas supply for the parish and surrounding districts, situated partly in Somerset and partly in Gloucester, and to adopt agreements with H. D'Aeth and the United Gas-Works Development Company (the promoters).—The Wensleydale Gas and Electricity Company has been registered with a capital of £3000 in £1 shares.

Gas Supply for Kingskerswell.—The laying of the main for the supply of gas to Kingskerswell was commenced last Tuesday. Hitherto the village, which is three miles from Torquay, has been dependent on oil for its illumination. But, at the instance of a number of the inhabitants, negotiations were opened with the Torquay Corporation and the Newton Abbot Gas Company for the supply of gas from their works; and eventually an agreement was entered into by which the village is to be served from the Torquay municipal gas-works at St. Mary Church. For the present, the supply will be confined to private residents—the Parish Council not being agreed upon the subject of public lighting. The cost of the necessary works to the Corporation will be £2900; and the price to be charged for gas will be 4s. per 1000 cubic feet to ordinary consumers and 5s. for slot-meter supplies. Mr. C. Waymouth, the Chairman of the Gas Committee of the Torquay Town Council, formally began the cutting of the trench in which the main will be laid, and expressed the hope that the supply would be of benefit to Kingskerswell and remunerative to the Corporation. Mr. W. H. Mortimer, the Chairman of the Kingskerswell Parish Council, said he believed that the undertaking would be very successful. Gas lighting would be a great boon to the village, which he was sure would make rapid progress in the future. When gas was once brought into use, it would not be long before it would be employed for lighting the streets. Mr. F. Chalmers, the Manager of the St. Mary Church Gas-Works, said he hoped gas would be supplied at Kingskerswell in about two months.

Newmarket (Co. Cork) Water Supply.—The opposition to the proposed water-works scheme for Newmarket and the district—an important co. Cork centre—has broken down, and approval has been voted by a representative meeting of ratepayers of what is known as the Mount Keefe scheme, which will involve an expenditure of £1200 and a rate, as estimated, of not more than 2d. in the pound.

Exhibits of Gas Appliances in Glasgow.—There is at present open in Glasgow a "Building and Decorative Exhibition;" and among the sixty stands, the Corporation Gas Department have a display of "Glasgow" cookers and range hotplates, as supplied to their consumers on free hire. Gas-fires are shown in great variety, finished in art-black and porcelain colours, in designs to suit the different styles of grates. In the centre of the stand two fire-places are fitted with gas-fires in actual operation—one showing a gas-fire fitted to an interior, the other demonstrating a built-in gas-fire. The heating section also shows gas-heated steam radiators for halls, churches, &c. There is also a representative collection of gas-heating appliances for restaurant, laundry, and general purposes. The stall is well illuminated. Four lamps have been erected—two of them being low-pressure outdoor lamps, each of 1000 candle power; the other two illustrating indoor lighting, being 500 candle power each. There is also an instructive display of wall brackets. A special exhibit is the gas-heated water section, which includes a bath supplied by an instantaneous geyser. A circulating plant consisting of circulator, storage tank, and cistern is also shown in working operation. It is specially adapted for bottle-washing, hair-dressers, or places where a quick delivery of hot water is required.

Suffocated by Coal Gas.—An old Sheffield lady, 79 years of age, was found "gassed" in her bedroom last Tuesday. At the Coroner's inquest, the woman's daughter said that deceased, who had lived with her for about two years, slept alone in a bedroom, and always had a light until early morning, when she would get out of bed and turn off the gas. On the Monday evening deceased was in her usual good health when she retired about 9.30 p.m. There was no escape of gas, and witness left her quite well in the bedroom. Shortly after seven o'clock next morning, thinking she could smell gas in the house, the daughter investigated the landing and bath-room, and found everything secure, and then she entered deceased's bedroom, which was full of gas, and deceased was lying dead in bed. She thought deceased had got up as usual to turn out the light, and, after turning off the tap, the sleeve of her nightdress had caught it and turned it on a little. The tap was easily turned, and when the discovery was made it was found to be turned on. Mr. Heald remarked on the presence of gas when he got up. He said he was downstairs trying to find the "escape" when his wife screamed. On going upstairs he found deceased dead in bed. The room was full of gas. Dr. R. T. Martin, who was called in, could only pronounce life to be extinct. He told the Jury that death was due to syncope from asphyxia. The Jury returned a verdict that deceased was "Accidentally suffocated by coal gas, and that probably she inadvertently turned on the gas tap after turning it off."

"VOLCANIC" (Powder). "VOLCUM" (Paste).

Andrew Stephenson,

Tel. Address:
"VOLCANISM, LONDON."

171, Palmerston House,
Old Broad Street,
LONDON, E.C.

LEST YE FORGET.

Wages of Smethwick Gas Employees.—The Gas Committee of the Smethwick Corporation have had under consideration the question of the wages of fitters, youths, and assistants in the Gas Department, and have adopted a scale under which the youths will commence, at the age of fourteen, at 6s. per week, rising 1s. per week half yearly until the age of twenty-one, when the rate is 6d. per hour, with annual increases up to 8½d.

Workmen Overcome by Gas at Mallow.—While fixing a valve connecting two large holders at the Mallow Gas-Works, the works manager and the fitter and stoker were overcome by the fumes of escaping gas. The fitter managed to get away; but his companions had to be dragged in an unconscious condition out of the pit in which they were at work. A medical man rendered prompt assistance, and restored them to consciousness. Between 14,000 and 15,000 cubic feet of gas escaped.

Price of Water in London.—Referring to this subject last Friday, the "Municipal Journal" said: "On their return to work after the summer vacation, the contributory authorities of the metropolitan water area are learning that the doubts they entertained as to the power of the Water Board to make a precept for the accumulated deficiency to March 31, 1912, have been removed by the Board's Act of the past session. The precepts have been issued, and the financial officers of the local authorities concerned have made provision for them in their estimates. The deficiency sounds large—£209,572 13s. 6d.; but it means only an increase of 1d. in the pound on the rates in the area affected, and even with this addition water is certainly one of the cheapest things the Londoner buys. For 5 per cent. on rateable value *plus* the penny of the precept, he gets one of the finest water services in the world, whether it is regarded from the point of view of quantity, quality, or constancy of supply. Nevertheless, it is the fashion to regard the Water Board as one of the most oppressive authorities ever set up to carry on a public service."

Gas-Meter Testing in London.—The Metropolitan Borough Councils have received from the Deputy-Clerk of the London County Council a letter stating that under the Sale of Gas Acts, 1859 and 1860, inspectors of gas-meters in London and elsewhere have no statutory authority to apply tests other than those prescribed in the Acts named; that these tests are of little value if the meter is to be used for high-pressure gas; and that, having regard to the increasing use of high-pressure gas, the County Council are of opinion that authority should be obtained to carry out adequate tests. The County Council have accordingly decided to make the necessary application to Parliament for this purpose next session. Reporting on the subject at a meeting of the Greenwich Borough Council last Wednesday, the General Purposes Committee expressed the opinion that it is very desirable that legislation on the lines indicated should be promoted; and they accordingly recommended that the Council should offer no objection to the costs and expenses incurred being defrayed out of the county fund, and being regarded as incurred for special county purposes.

Additional Capital for the Smethwick Gas Undertaking.—The Gas Committee of the Smethwick Corporation have instructed the Town Clerk to borrow £20,000, under the powers of the Smethwick Corporation Act, 1901, for the purpose of defraying the cost of the installation of vertical retorts now in course of erection, and meeting other capital expenditure. The period of repayment allowed under the Act is forty years; but it is intended to repay the loan as quickly as may be found convenient.

The Directors of Glover and Main, Limited, have declared an interim dividend at the rate of 5 per cent. per annum on both the preference and the ordinary share capital of the Company.

The Richmond Gas-Stove Company, Limited, have just secured an order for an installation of special gas-cooking apparatus for the postal department of H.M. Office of Works, Studd Street, Islington.

According to a telegram which reached London through Reuter's Agency, the Rand Water Board have given authority for a loan not exceeding £1,250,000 to provide for the supply of an additional 10 million gallons of water daily from Lindeques, on the Vaal River.

The Parkinson Stove Company, of Spring Hill, Birmingham, have forwarded a set of their new season's fire and radiator lists. Illustrated particulars of all the firm's patterns of fires, &c., are given; and readers will be able to ascertain from them the prices and details of the new "Edmund," "Ratcliff," and "Colmore" series which were the subject of editorial notice in last week's issue (p. 836).

Death duties amounting to more than £210,000 will be payable to the British Treasury from the estate of the late Mr. Anthony Nicholas Brady, of Albany, New York, whose death in London was recorded in the "JOURNAL" for the 29th of July last; leaving, apart from American property, estate in the United Kingdom valued at £1,315,528. Mr. Brady was connected with a number of gas and electric light companies.

The Directors of the Littleborough Gas Company are encouraging the cultivation of fruit and flowers by their employees by offering money prizes for the best specimens; and the first awards have just been made. Ground in the gas-works yard has been laid out in plots; and here the gardeners have worked, with conspicuous success. A representative of the "Rochdale Observer" recently visited the works, in company with Mr. S. E. Halliwell (the Manager and Secretary); and this is what he says: "Peds of flowers line the approach to the two huge holders, and behind these are the allotments, in which have been cultivated hardy flowers—they surely must be hardy!—and the common kind of vegetables. Not far away Mr. Halliwell pointed out a disused tip; and this had been converted into a garden. Beyond the other side of the gas-works boundary wall were the gardens of a member of the local Horticultural Society, who grows to some profit. So much, then, for the beautifying of some of our ugly town plots, which though a necessity cannot help but be ugly."

THE NAME

SAWER & PURVES
BRANCH OF METERS LTD.

ON YOUR METERS

IS THE HALL MARK OF EXCELLENCE.

MILES PLATTING, MANCHESTER. — The Pioneers of the Slot Meter. — RADFORD ROAD, NOTTINGHAM.

The Leatherhead Gas and Lighting Company recently advertised 600 £10 shares for sale by tender. They were all taken up. Rather more than the required number of shares were applied for; and the average price of those allotted was £10 1s. 1d.

The Lead Wool Company, of Snodland, Kent, are issuing a small pamphlet entitled "Hints on Caulking." It deals with single and double collar joints, caulking tools, joint holes, &c., and finishes with some "useful hints when joining cast-iron pipes," and "points to be observed when jointing steel pipes."

According to a Central News telegram sent from Pittsburgh last Thursday, the Philadelphia Company announce that they have just completed a gas well in Greene County (Penn.) with a producing capacity of 6 million cubic feet per day and a rock pressure of 1100 lbs. This is stated to be the highest rock pressure ever discovered in the "Big Injun" sand—a fact considered highly interesting and important.

It will be seen from announcements appearing elsewhere, that Messrs. A. & W. Richards will resume their sales of gas and water stocks and shares at the Mart, Tokenhouse Yard, next Tuesday, when, by order of the Directors of the respective undertakings, they will invite biddings for new issues of capital by the Bognor, Grays and Tilbury, and North Middlesex Gas Companies, and the Southend Water Company.

We have received from the Davis Gas-Stove Company, of Luton, a set of booklets, with coloured illustrated wrappers, concerning their specialities—some particulars of which will be found elsewhere in this issue. One pamphlet is devoted solely to the gas heated gilled-circulator, another to steamless radiators, and a third to geysers. Gas-fires have been particularly provided for by means of a new booklet, a special pamphlet dealing with "A" pattern fires, and an attractive show-card for use by gas companies, &c.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments Vacant.

AGENTS. No. 7592.
FOREMAN. No. 5794.
MANAGER AND SECRETARY. No. 5795.
CHEMIST. Bath Gas Works.
HOT WATER INSTALLATIONS. No. 5796.
FITTER. Castleford Gas Company.
GASFITTER. Cradley Heath Gas Company.
STOKER. Daventry Gas Works.

Manufacturer Wanted.

PATENTEE. 10, Cranley Place, S.W.

Plant, &c. (Second-Hand), for Sale.

HYDRAULIC MAINS. Beaumont and Son, Bromley-by-Bow.

Patent Licence, &c.

HEATING BURNERS. Cruikshank and Fairweather, 65 and 66, Chancery Lane, W.C.

Stocks and Shares.

BARBADOS GAS COMPANY. London Mart. Oct. 21.
BOGNOR GASLIGHT COMPANY. London Mart. Oct. 7.
CHRISTCHURCH GAS COMPANY. London Mart. Oct. 21.
DARTFORD GAS COMPANY. London Mart. Oct. 21.
ENFIELD GAS COMPANY. London Mart. Oct. 21.
GRAYS AND TILBURY GAS COMPANY. London Mart. Oct. 7.
NORTH MIDDLESEX GAS COMPANY. London Mart. Oct. 7.
SOUTHEND WATER COMPANY. London Mart. Oct. 7.
STANFORD-LE-HOPE GAS COMPANY. London Mart. Oct. 21.
SUTTON GAS COMPANY. London Mart. Oct. 21.
TENDRING HUNDRED WATER COMPANY. London Mart. Oct. 21.
WANDSWORTH WIMBLEDON AND EPSOM GAS COMPANY. By Tender. Oct. 13.

Meeting.

DANISH GAS COMPANY. Millbank House, Westminster. Oct. 21. 2.30 o'clock.

TENDERS FOR

Lamps.

CALCUTTA CORPORATION. Tenders by Jan. 5.

Mantles.

CALCUTTA CORPORATION. Tenders by Nov. 17.

Oxide.

DEVONPORT GAS DEPARTMENT. Tenders by Oct. 6.

Steel and Ironwork.

SHEFFIELD UNITED GAS COMPANY. Tenders by Oct. 6

A FIRE THAT WILL FIT UNDER THE EXISTING COAL GRATE CANOPY.

PARKINSON'S "COLMORE."

10-in. FIRE OPENING. PRICE, 24s.
With RECTANGULAR FLUE OUTLET,
INTENSE PILLAR FUEL, &c, &c.

THE PARKINSON STOVE CO., LTD.
BIRMINGHAM & LONDON.

GAS COMPANIES' STOCK AND SHARE LIST.

The Stock Exchange has had as quiet a week as if we were in the full tide of the holiday-making season. It ought not to be so in the last week of September; and it used not to be so. Various reasons accounting for this phenomenon are suggested; and some maintain that, outside and apart from special factors which oppress business—such as Balkan affairs, Irish affairs, and labour unrest—the public seem getting inclined to let Stock Exchange business alone. This is too wide a theme to discuss here; and let it suffice to say that business is not what it was. The opening day showed an aggregate below normal; but one or two fair points brightened the outlook. Government issues were firm; and Rails were cheered by arrangements made at certain foci of agitation—good for the nonce, howsoever uncertain of duration. But American changed for the worse; and Foreign were not strong. On Tuesday, all markets were apathetic and spiritless. Hardening money lowered Consols $\frac{1}{8}$ for account, and Rails moved up and down irregularly. Americans were about evenly balanced. On Wednesday, by way of variety, the centre of disturbance shifted across the Channel. Balkan affairs (so long devoid of terrors) sprang again into eruption, and displaced home labour anxieties. Foreign bourses rushed to realize some of their favourite counters in the game of speculation, and thus affected others. Tightening of money lent a helping hand. Thursday was shaky. The bourses appeared to have got over their "funk," and their markets mended, but again gave way later. Consols receded $\frac{1}{8}$; Rails were dull and droopy; Americans jumped about irregularly; and Foreign were not overstrong. Friday was very quiet and dull. Markets generally were in a debilitated condition—Government issues as badly as any. Consols dropped $\frac{1}{4}$, and Rail prices slowly melted, while no other departments had any strength. Saturday's business was almost *nil;* and movements throughout were few, slight, and devoid of interest. Consols closed at $73\frac{3}{8}$ to $73\frac{5}{8}$—a fall of $\frac{3}{8}$ in the week. In the Money Market, the position tightened day by day until nearly the close, when the tension was relieved. In the Gas Market, business on Monday was pretty active, and gave promise of a good week; but it relaxed as the week progressed, so that the full aggregate was but moderate. The general tone was quite satisfactory, and the few changes noted were unimportant. In Gaslight and Coke issues, the ordinary was firm; all transactions being within the same figure as the preceding week—$101\frac{3}{4}$ to $102\frac{1}{4}$. In the secured issues, the maximum was done at $74\frac{1}{8}$ to $75\frac{1}{4}$, the preference at $94\frac{1}{2}$ to 96, and the debenture at 73 to $73\frac{5}{8}$. South Metropolitan was quiet and unchanged at 110 to $110\frac{1}{2}$; and the debenture made 73 and $73\frac{3}{4}$. In Commercials, the 4 per cent. marked 105 to $106\frac{1}{2}$, and the debenture $72\frac{3}{4}$. Among the Suburban and Provincial group, Alliance and Dublin was done at $59\frac{1}{4}$—a fall of 5, in view of a dividend reduced to 4 per cent. Perhaps this may arouse the shareholders. Bournemouth "B" realized $14\frac{7}{8}$ and 15, Brentford old 263 (a rise of 3), Lea Bridge 120, and Wandsworth "B" 133 and $133\frac{1}{2}$. In the Continental companies, Imperial changed hands at 166 and 167, ditto debenture at $84\frac{3}{4}$ to $86\frac{1}{2}$ (a rise of $\frac{1}{2}$), Union at $81\frac{1}{4}$, and European at 18 and $18\frac{1}{4}$. Among the undertakings of the remoter world, Ottoman made $8\frac{1}{2}$ and $8\frac{9}{16}$ *cum div.*, Primitiva $6\frac{1}{2}$ to $6\frac{13}{32}$, ditto preference 5 and $5\frac{1}{16}$, and River Plate debenture 90.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	April 11	4†	Alliance & Dublin Ord.	58–63	–5	6 7 0
274,000	,,	July 11	4	Do. 4 p.c. Deb.	80–83	..	4 16 5
280,000	5	April 11	$7\frac{1}{2}$	Bombay, Ltd.	$6\frac{1}{2}$–$6\frac{3}{4}$		5 11 1
50,000	10	Aug. 28	15	Bourne- / mouth Gas / and Water	10 p.c.	..	$28\frac{1}{2}$–$29\frac{1}{2}$	5 2 2
347,500	10	,,	7		B 7 p.c.	..	$14\frac{3}{4}$–$15\frac{1}{4}$	4 11 10
75,000	10	,,	6		Pref. 6 p.c.	..	$13\frac{1}{4}$–$13\frac{3}{4}$	4 7 3
380,000	Stk.	Aug. 14	14	Brentford Consolidated	262–267	+3	5 4 10
330,000	,,	,,	11	Do. New	198–203	+2	5 8 5
50,000	,,	,,	5	Do. 5 p.c. Pref.	111–113	..	4 8 6
206,250	,,	June 13	4	Do. 4 p.c. Deb.	94–96	..	4 3 4
217,380	Stk.	Aug. 28	11	Brighton & Hove Orig.	201–206	..	5 6 10
244,200	,,	,,	8	Do. A Ord. Stk.	148–151	..	5 6 0
530,000	20	Sept. 26	$12\frac{1}{2}$	British	44–45*	..	5 11 1
120,000	Stk.	June 27	4	Do. 4 p.c. Deb. Stk.	87–89	..	4 9 11
245,771	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	$89\frac{1}{2}$–$91\frac{1}{2}$	..	4 7 5
100,000	10	—	—	Cape Town & Dis., Ltd.	2–3	..	—
100,000	10	—	—	Do. $4\frac{1}{2}$ p.c. Pref.	4–5	..	—
100,000	Stk.	June 27	$4\frac{1}{2}$	Do. $4\frac{1}{2}$ p.c. Deb. Stk.	75–80	..	5 12 6
157,150	Stk.	Aug. 14	5	Chester 5 p.c. Ord.	107–109	..	4 11 9
1,513,280	Stk.	Aug. 28	5/9/4	Commercial 4 p.c. Stk.	105–107	..	5 2 1
560,000	,,	,,	$5\frac{1}{2}$	Do. $3\frac{1}{2}$ p.c. do.	102–104	..	5 2 6
475,000	,,	June 13	3	Do. 3 p.c. Deb. Stk.	$71\frac{1}{2}$–$73\frac{1}{2}$		4 1 8
800,000	Stk.	,,	4	Continental Union, Ltd.	80–83	..	4 16 5
200,000	,,	,,	7	Do. 7 p.c. Pref.	124–126	..	5 11 1
492,270	Stk.	,,	5	Derby Con. Stk.	123–124	..	4 0 8
55,000	,,	—	4	Do. Deb. Stk.	102–104	..	3 16 11
1,002,180	10	July 30	10	European, Ltd.	$17\frac{1}{2}$–$18\frac{1}{2}$		5 8 1
16,386,660	Stk.	Aug. 14	4/17/4	Gas- / light and / Coke	4 p.c. Ord.	..	101–103	4 14 6
2,600,000	,,	,,	$3\frac{1}{2}$		$3\frac{1}{2}$ p.c. max.	..	74–77	4 10 11
4,062,235	,,	,,	4		4 p.c. Con. Pref.	..	93–96	4 3 4
4,674,850	,,	June 13	3		3 p.c. Con. Deb	..	73–75	4 0 0
258,740	Stk.	Sept. 11	5	Hastings & St. L. 3½ p.c.		..	87–89	5 12 4
82,500	,,	,,	$6\frac{1}{2}$	Do. do. 5 p.c.		..	—	—
70,000	10	April 25	11	Hongkong & China, Ltd.		..	$17\frac{1}{2}$–$17\frac{3}{4}$	6 3 11
131,000	Stk.	Sept. 11	$7\frac{1}{2}$	Ilford A and C		..	150–153	4 19 8
65,780	,,	,,	$6\frac{1}{2}$	Do. B		..	118–120	5 2 1
65,500	,,	June 27	4	Do. 4 p.c. Deb.		..	89–91	4 7 11
4,940,060	Stk.	May 16	9	Imperial Continental		..	163–168	5 7 2
1,235,000	Stk.	Aug. 14	8½	Do. 3½ p.c. Deb. Red.		+½	83½–85½	4 1 10
200,242	Stk.	Aug. 28	$6\frac{1}{2}$	Lea Bridge Ord. 5 p.c.		..	118–121	5 3 4
561,000	Stk.	,,	10	Liverpool United A		..	204–206	4 17 1
718,100	,,	,,	7	Do. B		..	142–144	4 17 3
306,083	,,	June 27	4	Do. Deb. Stk.		..	96–98	4 1 8
63,480	Stk.	June 27	3	Maidstone 3 p.c. Deb.		..	66½–68½	4 7 7
75,000	5	June 13	6	Malta & Mediterranean		..	$4\frac{1}{8}$–$4\frac{1}{4}$	6 3 1
250,000	100	April 1	$4\frac{1}{2}$	Met. of Melbourne / 4½ p.c. Deb.		..	98–100	4 10 0
541,920	20	May 30	4	Monte Video, Ltd.		..	$12\frac{1}{2}$–$12\frac{3}{4}$	6 5 6
1,775,892	Stk.	July 30	$4\frac{1}{2}$	Newc'tle&G'tesh'd Con.		..	$99\frac{1}{2}$–$100\frac{1}{2}$	4 9 7
529,705	Stk.	June 27	$3\frac{1}{2}$	Do. 3½ p.c. Deb.		..	$83\frac{1}{2}$–$84\frac{1}{2}$	4 2 10
55,940	10	Aug. 28	7/10/6	North Middlesex 7 p.c.		..	$12\frac{1}{2}$–$13\frac{1}{2}$	5 11 5
300,000	Stk.	May 16	8	Oriental, Ltd.		..	124–129	6 4 0
60,000	5	Sept. 26	10	Ottoman, Ltd.		..	8–$8\frac{1}{4}$*	6 1 3
60,000	50	Aug. 14	13	Portsea, Island B		..	122–125	5 6 1
100,000	50	,,	12	Do. C		..	119–122	4 18 4
249,980	5	May 16	8	Primitiva Ord.		..	6–$6\frac{1}{2}$	6 3 1
499,960	5	June 27	5	,, 5 p.c. Pref.		..	5–$5\frac{1}{2}$	4 15 3
521,600	100	June 2	4	,, 4 p.c. Deb.		..	93–95	4 4 3
346,198	Stk.	June 27	4	River Plate 4 p.c. Deb.		..	90–92	4 7 0
275,000	5	Sept. 26	12	San Paulo, Ltd.			—	—
150,000	10	,,	6	Do. 6 p.c. Pref.		.	11–$11\frac{1}{4}$*	5 6 8
125,000	50	July 1	5	Do. 5 p.c. Deb.		+1	49–51	4 18 0
185,000	Stk.	Aug. 28	10	Sheffield A		..	220–222	4 10 1
209,984	,,	,,	10	Do. B		..	220–222	4 10 1
523,500	,,	,,	10	Do. C		..	220–222	4 10 1
90,000	10	May 30	$7\frac{1}{2}$	South African		..	$9\frac{1}{2}$–$10\frac{1}{2}$	7 2 10
6,429,895	Stk.	Aug. 14	5/9/4	South Met., 4 p.c. Ord.		..	109–111	4 18 6
1,895,445	,,	July 11	3	Do. 3 p.c. Deb.		..	73–75	4 0 0
209,820	Stk.	Aug. 14	$8\frac{1}{2}$	South Shields Con. Stk.		..	157–159	5 6 11
952,795	Stk.	,,	6	S'th Suburb'n Ord. 5 p.c.		..	115–117	5 2 7
60,000	,,	,,	5	Do. 5 p.c. Pref.		..	113–115	4 6 11
117,058	,,	June 27	5	Do. 5 p.c. Deb. Stk.		..	115–117	4 5 6
594,740	Stk.	May 16	5	Southampton Ord.		..	102–105	4 15 3
120,000	Stk.	Aug 14	$7\frac{3}{8}$	Tottenham / and / Edmonton	A 5 p.c.	..	136–139	5 6 1
513,940	,,	,,	$5\frac{5}{8}$		B 3½ p.c.	..	114–116	5 1 3
149,470	,,	June 27	4		4 p.c. Deb.	..	90–92	4 7 0
182,380	10	,,	5	Tuscan, Ltd.		..	5–6	8 6 8
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.		..	96–98	5 2 0
236,476	Stk.	Aug. 14	5	Tynemouth, 5 p.c. max.		..	111–113	4 8 6
30,000	Stk.	Aug. 28	$8\frac{3}{4}$	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.		..	155–160	5 4 8
255,636	,,	,,	$6\frac{1}{2}$	,, B 3½ p.c.		..	132–137	5 0 4
108,075	,,	,,	5/17/3	,, C 3½ p.c.		..	110–115	5 2 0
322,000	,,	,,	$6\frac{1}{2}$	Wimbledon 5 p.c.		..	111–116	5 5 7
18,000	,,	,,	$6\frac{3}{4}$	Epsom 5 p.c.		.	115–120	5 10 5
88,416	,,	June 27	3	3 p.c. Deb. Stk.		..	68–70	4 5 9

Prices marked * are "Ex-Div." † Next dividend will be at this rate.

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